Pride and Purpose

AEROSPACE

Facts & Figures 91-92

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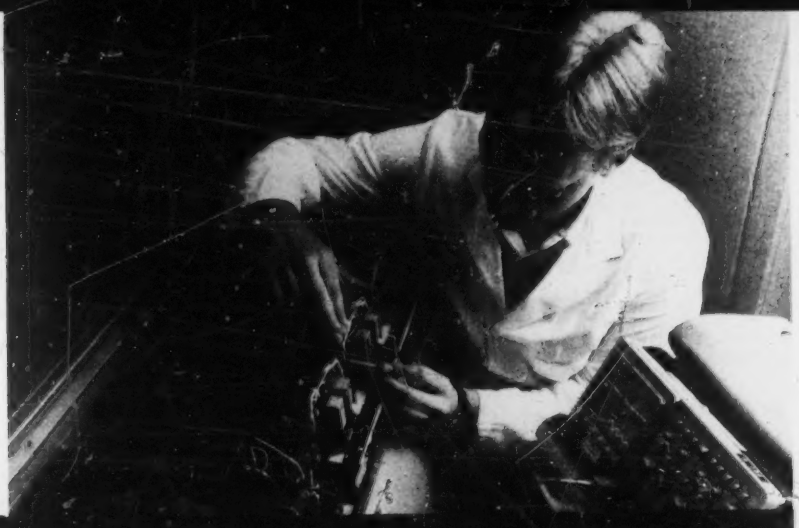

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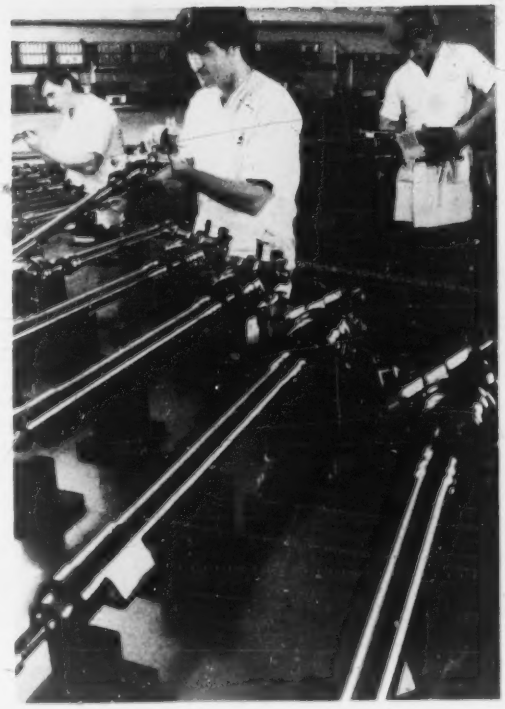


The U. S. Aerospace Team

Pride and Purpose

The U.S. aerospace workforce is a world class team. Smart, skilled, and resourceful, they are the people behind the products—those that move us ahead in commercial aviation and space, and those that help America defend freedom at home and around the world. They are the people who helped make victory in Desert Storm possible.

The U.S. aerospace team is committed to innovation, to new products and processes, to doing things better than yesterday. The team is 1.2 million strong, and dedicated to making tomorrow possible.

91-92

Foreword

For the U.S. aerospace industry, 1990 was a year remarkably similar to its predecessor in that the industry set new records for sales, backlog, export volume and trade balance.

But there was one significant difference: In 1989, the flow of new orders surged to an all-time high; in 1990, new orders declined for the first time since 1986.

The reduction in total new industry orders was significant —15 percent. It was occasioned almost entirely by a sharp downward plunge — nearly 30 percent — in orders from the U.S. Government, meaning, for the most part, orders for defense systems.

That fact exemplifies what the industry can expect from the decade of the 1990s: a continuing real-term decline in the defense sales level, offset to a degree by high levels of sales in non-defense areas.

On the positive side, 1990 overall sales not only set a record but eclipsed the prior record by an impressive 14 percent. The principal factor in that record performance was a big increase in non-military sales, in particular, sales of commercial transport aircraft.

Despite the decline in U.S. Government orders, the industry's overall backlog grew appreciably, to $264 billion at year-end 1990, a gain close to $12 billion. Orders from non-government sources constituted nearly two-thirds (65 percent) of the backlog.

Space sector sales continued their steady rise and reached a new record level. In dollar terms, space business amounted to a solid 22 percent of total sales. The indicated future growth

of the industry's space workload offers a good measure of compensation for declining defense activity.

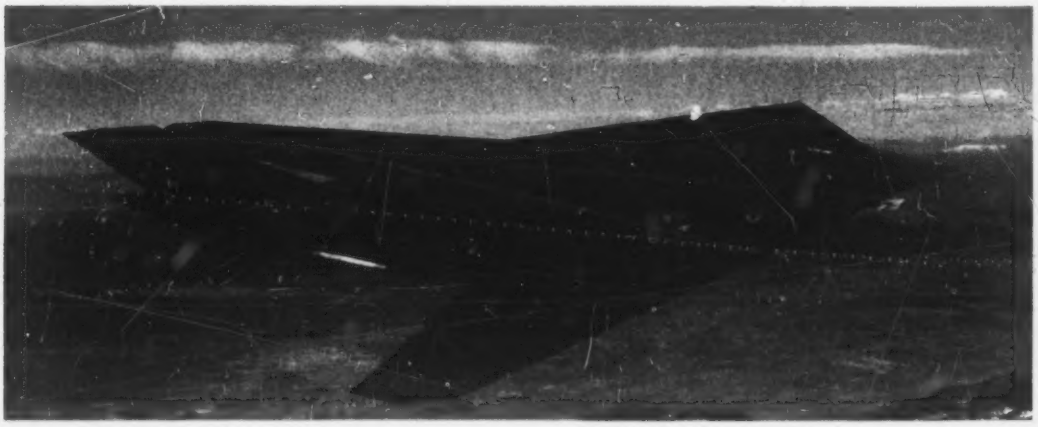
The importance to the U.S. economy of high value, high technology aerospace exports was underscored once again by the industry's record performance in foreign sales and trade balance. In a year in which the U.S. as a whole experienced a trade deficit of $101 billion, U.S. aerospace exports amounted to more than $39 billion, just under 10 percent of all U.S. merchandise exports in 1990. The aerospace trade balance topped the prior record by 23 percent.

As regards the industry's future outlook, AIA estimates — on the basis of the Administration's force reduction program outlined by the Secretary of Defense — that DoD aerospace sales will drop by 1995 to roughly 25 percent below the 1990 level in real terms.

That is a very large reduction and one that will pose a serious problem for those companies most heavily committed to defense work. The picture is less grim for the industry as a whole, because it is expected that much of the business lost to defense downsizing will be offset by gains in other areas.

In the weeks preceding publication of this volume, there have been a number of calls for defense cuts below the levels envisioned by the Administration plan. At the moment of writing, however, there has been no concerted action toward drastic cuts below the appropriation levels planned by the Administration.

AIA expects further downward pressure on the defense budget but not reductions of disastrous dimension. Therefore, the association stands by its earlier projection that overall sales, in real, inflation-adjusted terms, will decline on a moderate curve throughout the decade. The decline will be serious but not catastrophic.



To adjust to the changing environment, the aerospace industry is energetically pursuing new efficiencies in every aspect of its operation. So there is a bright side to the outlook: the industry may emerge from this decade of transition in better financial, technological and competitive strength than it enjoys today.

Don Fuqua
President
Aerospace Industries Association

91-92 Aerospace Summary

The U.S. aerospace industry recorded an all-time sales peak in 1990 in both current and constant dollars, according to data compiled by the Aerospace Industries Association (AIA). In current dollar terms, the record volume was compounded of increases in all sales categories.

Separately-reported data from the Bureau of the Census similarly showed peaks in current/constant dollar overall sales, and current dollar gains in most sales categories.

The principal factor in the industry's record performance was another big increase in non-military sales — in particular, sales of commercial transport aircraft. An additional factor was an upward fluctuation in sales to the Department of Defense, which had been on a declining curve since 1987.

Here is the breakdown of the industry's performance in 1990:

Sales

In current dollars, overall sales amounted to $134.2 billion; a 14 percent increase over 1989's $117.6 billion. Aerospace sales to the Department of Defense, after two years of decline, rebounded to $60.6 billion, well over half of total aerospace products and services sales and up 3.6 percent over the prior year's $58.5 billion.

In a breakdown by product group, aircraft sales predominated, as is customarily the case. Aircraft sales totaled $70.8 billion, 16 percent above the record $61 billion reported in the previous year.

Military aircraft sales amounted to $39.9 billion, up slightly from 1989 in current dollars but actually a decline when

adjusted for inflation. Civil aircraft sales (including engines and parts) totaled $30.9 billion, up almost 40 percent over the previous record (1989) of $22.1 billion.

The big gain moved civil aircraft into second place among product categories, after having trailed space sales for seven prior years. Space sales nonetheless showed a strong gain, up 12 percent from $25.8 billion in 1989 to $28.9 billion in 1990.

Sales of missile systems, at $12.1 billion, increased from 1989's $11.2 billion. In the "Related products and services" category, sales amounted to $22.4 billion, which compares with $19.6 billion in 1989.

For 1990, aerospace industry sales represented 2.5 percent of the Gross National Product and 4.6 percent of total sales by all U.S. manufacturing industries. The comparable figures for 1989 were 2.3 percent and 4.1 percent.

Earnings

The industry recorded a net profit after taxes of $4.5 billion, compared with $3.9 billion in 1989. Expressed as a percentage of sales, the 1990 profit (3.4 percent) approximated that of 1989 (3.3 percent).

Aerospace earnings remained well below the average for all U.S. manufacturing industries in terms of sales and assets. The 3.4 percent realized on aerospace sales compare with 4.0 percent for all manufacturing corporations. As a percentage of assets, the aerospace profit amounted to 3.4 percent; the all-manufacturing figure was 4.3 percent. In terms of equity, aerospace earnings amounted to 11.5 percent, compared with the all-industry average of 10.7 percent.

Orders and Backlog

After surging to an all-time high of $173.6 billion in 1989, net new orders received by aerospace companies dropped sharply to $147.4 billion according to the Census Bureau. Most of the decline was due to a plunge in orders from the Department of Defense, which fell to the lowest level since 1981.

Orders from the U.S. Government totaled $56.8 billion, down from $80.6 billion in 1989. Census reported declining orders in all product categories.

Despite those declines, the industry's backlog rose appreciably, from $252.4 billion at the end of 1989 to $264.2 billion as of December 31, 1990. This was due to the fact that non-government backlog experienced a large increase (more than $27 billion) that more than offset a sharp decline in the backlog of government business (down more than $15 billion). The major component of the non-government backlog, and also the major area of gain, was civil aircraft, engines and parts; the backlog increase was more than $25 billion. These data once again underline the indicated shift in the industry product mix during the 1990s, in which commercial product manufacture is expected to account for an ever-increasing percentage of total sales.

Civil Aircraft Production

Sales of civil aircraft declined in numerical terms (from 2,448 in 1989 to 2,268 in 1990) but increased dramatically in dollar value ($24.5 billion in 1990 compared with $17.1 billion in 1989).

In terms of dollar value, sales of transport aircraft accounted for more than 90 percent of the civil aircraft total. The industry shipped 521 commercial transports valued at $22.2 billion, which compares with 398 units worth $15 billion in the previous year.

Shipments of general aviation planes declined by 391 units but total dollar value of the 1,144 aircraft delivered came to more than $2 billion, up

from $1.8 billion in 1989.

Sales of civil helicopters, at $254 million, were up from $251 million.

Military Aircraft Production

The industry produced 1,062 military aircraft in 1990, including 674 planes for the U.S. military services and 388 exported under Foreign Military Sales (FMS) programs or through direct sales by U.S. manufacturers to foreign governments. The comparable figures for 1989 were 1,261 total, 614 for U.S. services, 647 shipped abroad.

Acceptances by U.S. military agencies totaled 773 aircraft (the 674 for the U.S. military plus 99 FMS aircraft). The bulk of the acceptances was in fighter/attack aircraft (451 units) and helicopters (260 units). Total flyaway value of the 773 acceptances was $13.2 billion (up from $12 billion in 1989).

Foreign Trade

Once again the aerospace industry set new records for export volume and trade balance. Aerospace exports increased by almost 22 percent to $39.1 billion; the aerospace trade balance — $27.3 billion — represented a 24 percent increase over the prior record ($22.1 billion in 1989). Aerospace exports amounted to 9.9 percent (in dollar value) of all U.S. merchandise exports in 1990.

Aerospace imports continued to climb; they set a seventh consecutive record at $11.8 billion, up from $10 billion in 1989.

Civil products accounted for more than 80 percent of the total U.S. aerospace export volume. Civil aerospace exports totaled $31.5 billion in 1990, up from $25.6 billion in the previous year. Military exports reached an all-time high of $7.6 billion, which compares with $6.5 billion in the previous year.

Space Systems

Sales of space systems have increased in both current and constant dollars in every year since 1977. With sales of $28.9 billion in 1990, the industry recorded exceptional growth — 12 percent above the 1989 level of $25.8 billion. But despite the increase, space slipped from second to third place among industry product groupings.

The pace of new orders for space systems slowed significantly in 1990 according to Bureau of the Census data, which exclude propulsion systems. Net new orders totaled $9.6 billion, down 18 percent from the record 1989 level of $11.7 billion. Nonetheless, the year-end space backlog, at $13.3 billion (again excluding propulsion) remained relatively constant, backlog at year-end 1989 was $13.4 billion.

The prospect of continuing high levels of space sales was evidenced in data on government investment in space. Federal space outlays for FY 1990 amounted to $28.1 billion, up from $25.1

billion in FY 1989. For FY 1991, the estimate was $29.8 billion.

Missile Systems

Since 1982, sales of missile systems and parts have remained relatively constant in the $10-12 billion a year range, according to AIA data. In 1990, the industry recorded an eight percent gain to $12.1 billion.

Bureau of the Census data, not directly comparable because Census excludes propulsion units, showed a slight decline in missile and parts sales, from $9.3 billion in 1989 to $9.1 billion in 1990. Separately, Census data covering propulsion systems for missiles and space launch vehicles shows 1990 sales of $3.1 billion, which compares with $3.6 billion in 1989.

Net new orders for missile systems and parts came to $7.9 billion in 1990 (excluding propulsion); this compares with $9 billion in the previous year. Orders for missile/space propulsion systems amounted to $3.2 billion in 1990, far below 1989's $6.1 billion. Census showed the year-end backlog for missiles and parts at $12.8 billion, down from $14 billion at year-end 1989; the backlog for missile/space propulsion systems was $6.5 billion, up from $6.4 billion.

Research and Development

According to the National Science Foundation, U.S. R&D funding from all sources in 1991 is expected to total $151.6 billion, up four percent from the 1990 level of $145.5 billion. Of the total, U.S. industry would spend $78 billion, or 51 percent of the total, and would perform 72 percent of the R&D.

R&D performed by the aerospace industry in 1990 including both federal and industry funding was estimated by Battelle Memorial Institute at $24.3 billion. For 1991, the industry-funded portion was expected to drop by $117 million to $6.8 billion.

Government estimates put federal outlays for R&D at $63.4 billion in FY 1991, compared with $62 billion in FY 1990. For FY 1992, the estimate is $68.1 billion.

The Department of Defense continues to be the largest — by far — conductor of government-funded R&D. DoD outlays for FY 1991 were estimated at $36.1 billion; the estimate for FY 1992 is $38.4 billion. NASA outlays were estimated at $7 billion in FY 1991 and $7.8 billion in FY 1992.

Employment

Due primarily to declining defense activity, industry employment fell by 19,000 in 1990 on an annual average basis. Annual average employment dropped from 1,314,000 in 1989 to 1,295,000 in 1990, marking the first reduction since 1983.

Aerospace employment accounted for 6.8 percent of the total employment in all U.S. manufacturing industries, as was the case in 1989.

The aerospace payroll for 1990 amounted to $35.6 billion, up 3.6 percent over the $34.4 billion paid in 1989. For 1990, the aerospace payroll represented 6.5 percent of total payroll outlays by all U.S. manufacturing firms.

STANDARD INDUSTRIAL CLASSIFICATIONS APPLICABLE TO THE AEROSPACE INDUSTRY

3721	**AIRCRAFT**
37211	Military aircraft
37215	Civilian aircraft
37217	Modification, conversion, and overhaul of previously accepted aircraft
37218	Aeronautical services on complete aircraft, nec
3724	**AIRCRAFT ENGINES AND ENGINE PARTS**
37241	Aircraft engines for military aircraft
37242	Aircraft engines for civilian aircraft
37243	Aeronautical services on aircraft engines
37244	Aircraft engine parts and accessories
3728	**AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, NEC**
37281	Aircraft parts and auxiliary equipment, nec
37282	Aircraft propellers and helicopter rotors
37283	Research and development on aircraft parts
3761	**GUIDED MISSILES AND SPACE VEHICLES**
37611	Complete guided missiles (excluding propulsion systems)
37612	Complete space vehicles (excluding propulsion systems)
37613	Research and development on complete guided missiles
37614	Research and development on complete space vehicles
37615	All other services on complete guided missiles and space vehicles
3663	**RADIO AND TELEVISION COMMUNICATIONS EQUIPMENT**
36631	Communication systems and equipment, except broadcast
3764	**SPACE PROPULSION UNITS AND PARTS**
37645	Complete missile or space vehicle engines and/or propulsion units
37646	Research and development on complete missile or space vehicle engines and/or propulsion units
37647	Services on complete guided missile or space vehicle engines and/or propulsion units, nec
37648	Missile and space vehicle engine and/or propulsion unit parts and accessories
3769	**SPACE VEHICLE EQUIPMENT, NEC**
37692	Missile and space vehicle components, parts and subassemblies, nec
37694	Research and development on missile and space vehicle parts and components, nec
3669	**COMMUNICATIONS EQUIPMENT, NEC**
36691	Alarm systems
36692	Traffic control equipment
36693	Intercommunication equipment
3812	**SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL AND NAUTICAL SYSTEMS, INSTRUMENTS, AND EQUIPMENT**
38121	Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals
38122	Search, detection, navigation, and guidance systems and equipment
3829	**MEASURING AND CONTROLLING DEVICES, NEC**
38291	Aircraft engine instruments, except flight

Source: Office of Management and Budget, "Standard Industrial Classification Manual, 1987."

NOTE: The Standard Industrial Classification (SIC) is a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. It is revised periodically to reflect the changing industrial composition of the economy.

NEC Not elsewhere classified.

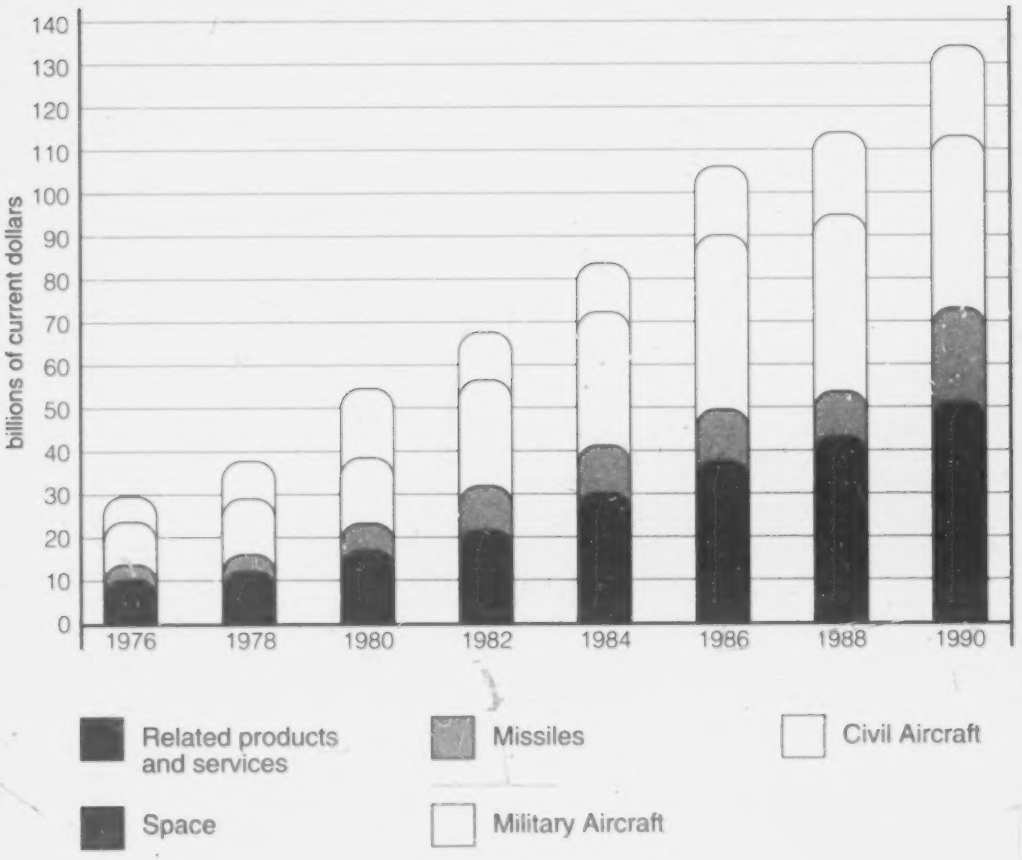
AEROSPACE INDUSTRY SALES BY CUSTOMER

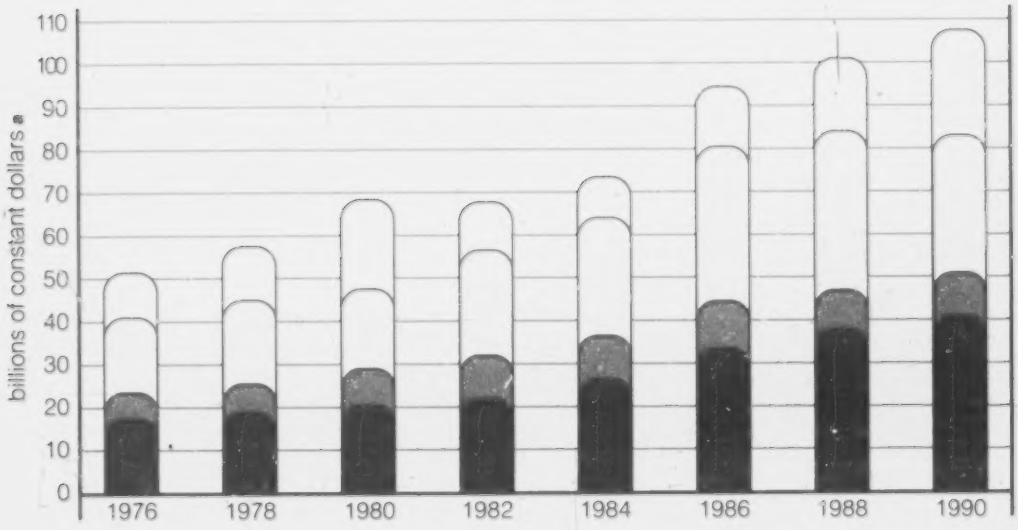
Calendar Years 1976 - 1990
(Millions of Dollars)

Year	TOTAL SALES	Aerospace Products and Services				Related Products and Services
		Total	U.S. Government		Other Customers	
			Dept. of Defense	NASA and Other Agencies		
CURRENT DOLLARS						
1976	$ 29,825	$ 24,514	$13,403	$ 2,938	$ 8,173	$ 5,311
1977	32,199	26,095	14,368	3,012	8,715	6,104
1978	37,702	30,889	15,533	3,151	12,205	6,813
1979	45,420	37,705	18,918	3,453	15,334	7,715
1980	54,697	45,878	22,795	4,106	18,977	8,819
1981	63,974	53,090	27,244	4,709	21,137	10,884
1982	67,756	56,366	34,016	4,899	17,451	11,390
1983	79,975	66,646	41,558	5,910	19,178	13,329
1984	83,486	69,572	45,969	6,063	17,540	13,914
1985	96,571	80,476	53,178	6,262	21,036	16,095
1986	106,183	88,486	59,161	6,236	23,089	17,697
1987	110,008	91,673	61,817	6,813	23,043	18,335
1988	114,562	95,468	61,327	7,899	26,242	19,094
1989	117,567	97,972	58,457	9,638	29,877	19,594
1990	134,158	111,798	60,573	11,097	40,128	22,360
CONSTANT DOLLARS (1982 = 100)[a]						
1976	$ 51,422	$ 42,266	$23,109	$ 5,066	$14,091	$ 9,157
1977	51,850	42,021	23,137	4,850	14,034	9,829
1978	57,648	47,231	23,751	4,818	18,662	10,417
1979	62,822	52,151	26,166	4,776	21,209	10,671
1980	68,116	57,133	28,387	5,113	23,633	10,983
1981	70,768	58,728	30,137	5,209	23,382	12,040
1982	67,756	56,366	34,016	4,899	17,451	11,390
1983	76,239	63,533	39,617	5,634	18,282	12,706
1984	73,491	61,243	40,466	5,337	15,440	12,248
1985	86,611	72,176	47,693	5,616	18,866	14,435
1986	94,806	79,005	52,822	5,568	20,615	15,801
1987	98,662	82,218	55,441	6,110	20,666	16,444
1988	101,025	84,187	54,080	6,966	23,141	16,838
1989[r]	98,300	81,916	48,877	8,059	24,981	16,383
1990	107,844	89,870	48,692	9,572	32,257	17,974

Source: Aerospace Industries Association.
NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," "Other Customers," and "Related Products and Services."
A comprehensive revision of the AIA aerospace industry sales series for 1967-1984 was completed in 1985 in order to incorporate different data sources and estimating procedures selected to better reflect the evolving composition of the aerospace industry.
a Based on revised aerospace composite price deflator.
r Revised.

Aerospace Sales by Product Group





Source: Aerospace Industries Association

a Based on AIA's aerospace composite price deflator (1982=100).

AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Related Products & Services
		Total	Civil	Military			
CURRENT DOLLARS							
1976	$ 29,825	$16,056	$ 6,007	$10,049	$ 3,671	$ 4,787	$ 5,311
1977	32,199	16,988	6,183	10,805	4,106	5,001	6,104
1978	37,702	21,074	8,222	12,852	4,098	5,717	6,813
1979	45,420	26,382	13,227	13,155	4,778	6,545	7,715
1980	54,697	31,464	16,285	15,179	6,469	7,945	8,819
1981	63,974	36,062	16,427	19,635	7,640	9,388	10,884
1982	67,756	35,484	10,982	24,502	10,368	10,514	11,390
1983	79,975	42,431	12,373	30,058	10,269	13,946	13,329
1984	83,486	41,905	10,690	31,215	11,335	16,332	13,914
1985	96,571	50,482	13,730	36,752	11,438	18,556	16,095
1986	106,183	56,405	15,718	40,687	11,964	20,117	17,697
1987	110,008	59,188	15,465	43,723	10,219	22,266	18,335
1988	114,562	60,886	19,019	41,867	10,270	24,312	19,094
1989	117,567	61,002	22,135	38,867	11,215	25,755	19,594
1990	134,158	70,785	30,920	39,865	12,142	28,871	22,360
CONSTANT DOLLARS (1982 = 100)[a]							
1976	$ 51,422	$27,683	$10,357	$17,326	$ 6,329	$ 8,253	$ 9,157
1977	51,850	27,356	9,957	17,399	6,612	8,053	9,829
1978	57,648	32,223	12,572	19,651	6,266	8,742	10,417
1979	62,822	36,490	18,295	18,195	6,609	9,053	10,671
1980	68,116	39,183	20,280	18,903	8,056	9,894	10,983
1981	70,768	39,892	18,171	21,720	8,451	10,385	12,040
1982	67,756	35,484	10,982	24,502	10,368	10,514	11,390
1983	76,239	40,449	11,795	28,654	9,789	13,295	12,706
1984	73,491	36,888	9,410	27,478	9,978	14,377	12,248
1985	86,611	45,275	12,314	32,961	10,258	16,642	14,435
1986	94,806	50,362	14,034	36,328	10,682	17,962	15,801
1987	98,662	53,083	13,870	39,213	9,165	19,970	16,444
1988	101,025	53,691	16,772	36,920	9,056	21,439	16,838
1989[r]	98,300	51,005	18,508	32,497	9,377	21,534	16,383
1990	107,844	56,901	24,855	32,046	9,760	23,208	17,974

Source: Aerospace Industries Association.
NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," and "Related Products and Services." A comprehensive revision of the AIA aerospace industry sales series for 1967-1984 was completed in 1985 in order to incorporate different data sources and estimating procedures selected to better reflect the evolving composition of the aerospace industry.

a Based on revised aerospace composite deflator.
r Revised.

SALES OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles, Space, & Rocket Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't	Other	U.S. Gov't	Other		U.S. Gov't	Other	
CURRENT DOLLARS									
1976	$ 31,328	$19,083	$12,245	$ 8,314	$ 7,622	$ 5,880	$ 2,368	$1,833	$ 5,311
1977	33,315	20,704	12,611	8,848	7,530	5,775	2,839	2,219	6,104
1978	37,968	21,888	16,080	8,724	10,581	6,380[a]	3,363	2,107[a]	6,813
1979	46,173	23,299	22,944	8,649	16,023	7,197	3,930	2,659	7,715
1980	58,440	26,674	31,766	9,427	20,097	8,393	6,869	2,609	11,045
1981	69,944	33,039	36,905	12,047	21,527	9,722	8,155	3,384	15,109
1982	75,487	42,239	33,248	15,120	16,766	11,980	9,909	4,953	16,759
1983	83,453	49,056	34,397	17,074	18,805	12,745	12,685	2,804	19,340
1984	88,941	55,777	33,164	20,216	17,069	13,624	12,734	2,768	22,530
1985	100,522	63,532	36,990	21,899	22,041	16,741	15,228	2,938	21,675
1986	105,577	65,326	40,251	22,755	25,002	17,535	16,243	3,564	20,478
1987	110,301	68,632	41,669	23,769	25,293	20,715	15,413	3,802	21,309
1988	113,548	68,104	45,444	21,316	29,426	21,514	16,103	3,225	21,964
1989[r]	122,148	72,184	49,964	21,371	32,454	22,643	16,661	3,852	25,167
1990	141,654	77,516	64,138	24,642	41,693	21,888	16,610	4,776	32,045
CONSTANT DOLLARS (1982 = 100)[b]									
1976	$ 54,014	$32,902	$21,112	$14,334	$13,141	$10,138	$ 4,083	$3,160	$ 9,157
1977	53,647	33,340	20,308	14,248	12,126	9,300	4,572	3,573	9,829
1978[r]	58,055	33,468	24,587	13,339	16,179	9,755	5,142	3,222	10,417
1979	63,863	32,225	31,734	11,963	22,162	9,954	5,436	3,678	10,671
1980	72,777	33,218	39,559	11,740	25,027	10,452	8,554	3,249	13,755
1981	77,372	36,548	40,824	13,326	23,813	10,754	9,021	3,743	16,713
1982	75,487	42,239	33,248	15,120	16,766	11,980	9,909	4,953	16,759
1983	79,555	46,765	32,790	16,276	17,927	12,150	12,092	2,673	18,437
1984	78,293	49,099	29,194	17,796	15,026	11,993	11,210	2,437	19,833
1985	90,154	56,979	33,175	19,640	19,768	15,014	13,657	2,635	19,439
1986	94,265	58,327	35,938	20,317	22,323	15,656	14,503	3,182	18,284
1987	98,925	61,553	37,371	21,317	22,684	18,578	13,823	3,410	19,111
1988	100,131	60,056	40,074	18,797	25,949	18,972	14,200	2,844	19,369
1989[r]	102,130	60,355	41,776	17,869	27,135	18,932	13,931	3,221	21,043
1990	113,870	62,312	51,558	19,809	33,515	17,595	13,352	3,839	25,760

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).
a AIA estimate based on M37D data.
b Based on revised aerospace composite price deflator.
r Revised.

ORDERS AND BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles, Space, & Rocket Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't	Other	U.S. Gov't	Other		U.S. Gov't	Other	
NET NEW ORDERS									
1976	$ 35,992	$ 21,056	$ 14,936	$ 9,513	$ 8,410	$ 5,751	$ 2,431	$3,241	$ 6,646
1977	38,922	22,682	16,240	9,369	11,193	6,232	3,554	2,170	6,404
1978	49,819	25,992	23,827	11,150	16,961	7,072[b]	4,631	2,450[b]	7,555
1979[a]	67,561[a]	28,107	37,101	8,762	30,695	7,609	5,184	4,487	8,471
1980	69,624	33,496	36,128	16,555	18,123	9,818	8,528	4,081	12,519
1981	74,922	42,431	32,491	16,946	17,911	12,376	[illegible]	3,250	15,089
1982[a]	89,168[a]	58,849[a]	30,319[a]	20,547	13,591	13,988	[illegible]	4,762	20,369
1983	91,647	60,290	31,357	22,171	16,428	14,248	15,209	2,641	20,950
1984	104,863	66,968	37,895	25,829	21,273	16,485	14,050	3,461	23,765
1985	110,968	70,240	40,728	23,751	26,191	20,328	14,730	2,800	23,168
1986	110,836	68,001	42,835	21,642	26,315	20,445	16,439	3,907	22,088
1987	121,224	66,264	54,960	17,019	35,328	26,272	13,899	4,658	24,048
1988	147,128	67,850	79,278	19,611	62,537	20,240	18,174	3,293	23,273
1989[r]	173,635	80,633	93,002	25,421	71,170	26,820	17,713	4,046	28,465
1990	147,380	56,788	90,592	15,024	66,777	20,735	13,382	3,553	27,909
BACKLOG AS OF DECEMBER 31									
1976	$ 39,702	$ 24,141	$ 15,561	$11,950	$ 8,929	$ 6,286	$ 2,046	$3,496	$ 6,995
1977	45,309	26,119	19,190	12,471	12,592	6,743	2,761	3,447	7,295
1978	57,160	30,223	26,937	14,897	18,972	7,557	4,029	3,668	8,037
1979[a]	78,548[a]	36,136	42,123	17,316	33,168	7,388	5,613	5,112	9,662
1980	89,732	37,199	52,533	17,435	39,800	8,941	8,421	5,127	10,008
1981	94,710	46,591	48,119	21,292	35,022	11,255	9,052	4,940	13,149
1982[a]	108,391[a]	63,201[a]	45,190[a]	26,644	31,920	13,262	13,268	4,269	16,760
1983	116,585	74,435	42,150	30,688	29,684	14,962	18,489	3,684	19,078
1984	132,507	85,626	46,881	36,312	33,877	17,823	19,684	4,498	20,313
1985	142,953	92,334	50,619	38,150	38,041	21,410	18,937	4,609	21,806
1986	148,212	95,009	53,203	37,041	38,350	24,320	19,133	4,952	23,416
1987	158,650	92,439	66,211	30,323	49,692	30,544	17,888	5,653	24,550
1988	191,518	92,394	99,124	28,412	82,868	29,078	19,822	5,496	25,842
1989[r]	252,401	107,797	144,604	36,320	122,830	33,771	23,558	8,280	27,642
1990	264,204	92,418	171,786	26,231	147,835	32,600	20,776	7,163	29,599

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).
a 1979 and 1982 Orders and Backlog Totals are final revisions for which product group detail is not available.
b AIA estimate based on M37D data.
r Revised.

AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1976 - 1990
(Billions of Dollars)

Year	Gross National Product[a]	Industry Sales			Aerospace Sales As Percent of		
		Manufacturing	Durable Goods	Aerospace	GNP	Manufacturing	Durable Goods
CURRENT DOLLARS							
1976	$1,782.8	$1,185.6	$ 608.4	$ 29.8	1.7%	2.5%	4.9%
1977	1,990.5	1,358.4	711.2	32.2	1.6	2.4	4.5
1978	2,249.7	1,522.9	814.2	37.7	1.7	2.5	4.6
1979	2,508.2	1,727.2	912.7	45.4	1.8	2.6	5.0
1980	2,732.0	1,852.7	930.6	54.7	2.0	3.0	5.9
1981	3,052.6	2,017.5	1,006.5	64.0	2.1	3.2	6.4
1982	3,166.0	1,960.2	952.2	67.8	2.1	3.5	7.1
1983	3,405.7	2,054.9	1,019.5	80.0	2.3	3.9	7.8
1984	3,772.2	2,254.4	1,188.2	83.5	2.2	3.7	7.0
1985	4,014.9	2,280.2	1,199.9	96.6	2.4	4.2	8.1
1986	4,231.6	2,260.3	1,201.7	106.2	2.5	4.7	8.8
1987	4,515.6	2,390.0	1,263.5	110.0	2.4	4.6	8.7
1988	4,873.7	2,611.6	1,388.2	114.6	2.4	4.4	8.3
1989[r]	5,200.8	2,840.3	1,494.4	117.6	2.3	4.1	7.9
1990	5,465.1	2,917.5	1,504.7	134.2	2.5	4.6	8.9

CONSTANT DOLLARS (1982 = 100)[b]					Real Annual Growth[c]			
					GNP	Mfg.	Durs.	Aero.
1976	$2,826.7	$1,878.9	$ 964.2	$ 51.4	4.9%	7.2%	9.1%	(8.2)%
1977	2,958.6	2,018.4	1,056.8	51.9	4.7	7.4	9.6	1.0
1978	3,115.2	2,109.3	1,127.7	57.6	5.3	4.5	6.7	11.0
1979	3,192.4	2,197.5	1,161.2	62.8	2.5	4.2	3.0	9.0
1980	3,187.1	2,161.8	1,085.9	68.1	(0.2)	(1.6)	(6.5)	8.4
1981	3,248.8	2,146.3	1,070.7	70.8	1.9	(0.7)	(1.4)	4.0
1982	3,166.0	1,960.2	952.2	67.8	(2.5)	(8.7)	(11.1)	(4.2)
1983	3,279.1	1,977.8	981.2	76.3	3.6	0.9	3.0	12.5
1984	3,501.4	2,093.2	1,103.2	73.5	6.8	5.8	12.4	(3.7)
1985	3,618.7	2,056.1	1,082.0	86.6	3.4	(1.8)	(1.9)	17.8
1986	3,717.9	1,986.2	1,056.0	94.8	2.7	(3.4)	(2.4)	9.5
1987	3,845.3	2,035.8	1,076.2	98.7	3.4	2.5	1.9	4.1
1988	4,016.9	2,153.0	1,144.4	101.1	4.5	5.8	6.3	2.4
1989[r]	4,117.7	2,248.9	1,183.2	98.3	2.5	4.5	3.4	(2.7)
1990	4,157.3	2,218.6	1,144.3	107.8	1.0	(1.3)	(3.3)	9.7

Source: Bureau of Economic Analysis, "Business Statistics" and "Survey of Current Business" (Monthly); and Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

a Calendar year GNP figures have been changed to reflect revisions to the National Income and Product Accounts (NIPA).

b "Aerospace" based on aerospace composite price deflator. "Manufacturing" and "Durable Goods" based on GNP implicit price deflator.

c Parentheses indicate negative real annual growth.

r Revised.

GROSS NATIONAL PRODUCT, FEDERAL BUDGET, AND DEFENSE BUDGET

Fiscal Years 1962 - 1992
(Billions of Dollars)

Year	Fiscal Year GNP	Federal Budget Outlays		Defense Outlays as percent of	
		Net Total[a]	National Defense[b]	GNP	Federal Budget
1962	$ 557.7	$ 106.8	$ 52.3	9.4%	49.0%
1963	587.8	111.3	53.4	9.1	48.0
1964	629.2	118.5	54.8	8.7	46.2
1965	672.6	118.2	50.6	7.5	42.8
1966	739.0	134.5	58.1	7.9	43.2
1967	794.6	157.5	71.4	9.0	45.4
1968	849.4	178.1	81.9	9.6	46.0
1969	929.5	183.6	82.5	8.9	44.9
1970	990.2	195.6	81.7	8.3	41.8
1971	1,055.9	210.2	78.9	7.5	37.5
1972	1,153.1	230.7	79.2	6.9	34.3
1973	1,281.4	245.7	76.7	6.0	31.2
1974	1,416.5	269.4	79.3	5.6	29.5
1975	1,522.5	332.3	86.5	5.7	26.0
1976	1,698.2	371.8	89.6	5.3	24.1
Tr.Qtr.	448.7	96.0	22.3	5.0	23.2
1977	1,933.0	409.2	97.2	5.0	23.8
1978	2,171.8	458.7	104.5	4.8	22.8
1979	2,447.8	503.5	116.3	4.8	23.1
1980	2,670.6	590.9	134.0	5.0	22.7
1981	2,986.4	678.2	157.5	5.3	23.2
1982	3,139.1	745.7	185.3	5.9	24.9
1983	3,321.9	808.3	209.9	6.3	26.0
1984	3,687.7	851.8	227.4	6.2	26.7
1985	3,952.4	946.3	252.7	6.4	26.7
1986	4,180.8[r]	990.3	273.4	6.5	27.6
1987	4,424.7[r]	1,003.8	282.0	6.4	28.1
1988	4,780.4[r]	1,064.1[r]	290.4	6.1	27.3
1989	5,131.3[r]	1,144.1[r]	303.6	5.9	26.5[r]
1990	5,405.6	1,251.7	299.3	5.5	23.9
1991[E]	5,615.8	1,409.6	298.9	5.3	21.2
1992[E]	5,985.5	1,445.9	295.2	4.9	20.4

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).
a "Net Total" is government-wide total less intragovernmental transactions.
b "National Defense" includes the military budget of DOD and other defense-related activites. Beginning in FY 1985, the Federal Budget reflects establishment of a military retirement trust fund. Data for prior years adjusted for comparable treatment of military retired pay.
E Estimate.
r Revised.
Tr.Qtr. See Glossary.

FEDERAL OUTLAYS
DEFENSE, NASA, AND AEROSPACE PRODUCTS & SERVICES

Fiscal Years 1964 - 1992
(Millions of Dollars)

Year	TOTAL National Defense	NASA	Federal Outlays for Aerospace Products & Services			Aerospace as Percent of Total National Defense and NASA
			TOTAL	DOD[a]	NASA	
1964	$ 54,757	$ 4,171	$13,363	$ 9,630	$ 3,733	22.7%
1965	50,620	5,093	11,858	7,296	4,562	21.3
1966	58,111	5,933	14,065	8,704	5,361	22.0
1967	71,417	5,426	15,478	10,341	5,137	20.1
1968	81,926	4,724	16,279	11,681	4,598	18.8
1969	82,497	4,252	15,872	11,686	4,186	18.3
1970	81,692	3,753	14,559	10,860	3,699	17.0
1971	78,872	3,382	12,918	9,580	3,338	15.7
1972	79,174	3,423	12,309	8,936	3,373	14.9
1973	76,681	3,315	11,360	8,089	3,271	14.2
1974	79,347	3,256	11,168	7,987	3,181	13.5
1975	86,509	3,267	11,544	8,373	3,181	12.9
1976	89,619	3,669	12,364	8,816	3,548	13.3
Tr.Qtr.	22,269	951	2,855	1,959	926	12.3
1977	97,241	3,945	13,229	9,389	3,840	13.1
1978	104,495	3,983	13,926	10,067	3,859	12.8
1979	116,342	4,197	16,686	12,622	4,064	13.8
1980	133,995	4,852	20,269	15,558	4,711	14.6
1981	157,513	5,421	24,276	19,002	5,274	14.9
1982	185,309	6,035	29,501	23,575	5,926	15.4
1983	209,903	6,664	35,364	28,808	6,556	16.3
1984	227,413	7,048	39,663	32,723	6,940	16.9
1985	252,748	7,318	44,483	37,335	7,148	17.1
1986	273,375	7,404	49,773	42,558	7,215	17.7
1987	281,999	7,591	51,871	44,429	7,442	17.9
1988	290,361	9,092[r]	48,848	39,922	8,926	16.3
1989	303,559	11,052	52,933	42,072	10,861	16.8
1990	299,331	12,429	53,202	40,992	12,210	17.1
1991[E]	298,910	13,499	53,592	40,456	13,136	17.2
1992[E]	295,245	14,721	50,002	35,726	14,276	16.1

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually); Department of Defense, "Status of Funds" (Annual Summaries); and NASA "Pocket Statistics" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "TOTAL NASA" includes all categories of the NASA budget; NASA construction is not included in "Aerospace Products and Services." See additional explanation with following table.

a Outlays for aircraft and missile procurement. Does not include RDT&E, which DOD has not reported by product group since 1977, and which, for comparability, has been subtracted from data previously reported in this table for earlier years. Also included are revisions to missile procurement data.

E Estimate. Latest year reflects Administration's budget proposal.

r Revised.

Tr.Qtr. See Glossary.

FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1964 - 1992
(Millions of Dollars)

Year	TOTAL	Department of Defense[a]			NASA[b]
		TOTAL	Aircraft	Missiles[c]	
1964	$13,363	$ 9,630	$ 6,053	$ 3,577	$ 3,733
1965	11,858	7,296	5,200	2,096	4,562
1966	14,065	8,704	6,635	2,069	5,361
1967	15,478	10,341	8,411	1,930	5,137
1968	16,279	11,681	9,462	2,219	4,598
1969	15,872	11,686	9,177	2,509	4,186
1970	14,559	10,860	7,948	2,912	3,699
1971	12,918	9,580	6,549	3,031	3,338
1972	12,309	8,936	5,927	3,009	3,373
1973	11,360	8,089	5,066	3,023	3,271
1974	11,168	7,987	5,006	2,981	3,181
1975	11,554	8,373	5,484	2,889	3,181
1976	12,364	8,816	6,520	2,296	3,548
Tr.Qtr.	2,885	1,959	1,557	402	926
1977	13,229	9,389	6,608	2,781	3,840
1978	13,926	10,067	6,971	3,096	3,859
1979	16,686	12,622	8,836	3,786	4,064
1980	20,269	15,558	11,124	4,434	4,711
1981	24,276	19,002	13,193	5,809	5,274
1982	29,501	23,575	16,793	6,782	5,926
1983	35,364	58,808	21,013	7,795	6,556
1984	39,663	32,723	23,196	9,527	6,940
1985	44,483	37,335	26,586	10,749	7,148
1986	49,773	42,558	30,828	11,730	7,215
1987	51,871	44,429	32,956	11,473	7,442
1988	48,848	39,922	28,246	11,676	8,926
1989	52,933	42,072	27,569	14,503	10,861
1990	53,202	40,992	26,142	14,851	12,210
1991[E]	53,592	40,456	26,269	14,187	13,136
1992[E]	50,002	35,726	23,133	12,593	14,276

Source: Department of Defense, "Status of Funds" (Annual Summaries); Office of Management and Budget, "The Budget of the United States Goverment" (Annually); and NASA, "Pocket Statistics" (Annually).

a Outlays for aircraft and missile procurement. Does not include RDT&E, which DOD has not reported by product group since 1977, and which for comparability, has been subtracted from data previously reported in this table for earlier years.

b Includes Research & Development and Research & Program Management, and effective with 1984 data, Space Flight, Control, and Data Communications; excludes Construction of Facilities.

c 1978 and subsequent years revised by AIA from previously published data to include Navy Weapons Procurement in Missiles Procurement. Beginning 1978, DOD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement, of which missiles comprise approximately 80 percent.

E Estimate. Latest year reflects Administration's budget proposal.

r Revised.

Tr.Qtr. See Glossary.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a]

Fiscal Years 1983 - 1992
(Millions of Dollars)

	1983	1984	1985
TOTAL[d]	$204,410	$220,928	$245,154
Procurement—TOTAL	$ 53,624	$ 61,879	$ 70,381
Aircraft	21,013	23,196	26,586
Missiles[b]	7,795	9,527	10,749
Ships	7,504	8,487	9,145
Weapons[b]	3,420	3,691	3,801
Ammunition	1,966	1,826	2,080
Other[c]	11,926	15,152	18,020
Military Personnel—TOTAL	60,886	64,158	67,842
Active Forces	41,015	42,732	60,344
Reserve Forces	4,508	4,923	7,498
Retired Pay	15,945	16,503	(d)
Adjustment: Retirement Trust Fund Accrual[d]	(583)	(2)	—
Research, Development, Test, & Evaluation	20,554	23,117	27,103
Operations & Maintenance	64,932	67,388	72,371
Military Construction	3,524	3,706	4,260
Family Housing	2,126	2,413	2,642
Other	(1,236)	(1,732)	553

Source: Department of Defense, "Status of Funds" (Annual Summaries) and Office of Management and Budget, "The Budget of the United States Government" (Annually).

NOTE: Data in parentheses are credit items. Detail may not add to totals because of rounding.

a Includes all items in the DOD military budget; excludes the DOD civil budget for the Army Corps of Engineers and other non-defense related activites.

b Beginning in 1978, DOD combined Navy Missiles Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.

c Includes Communications and Electronics.

d Beginning in FY 1985, the Federal Budget reflects establishment of a military retirement trust fund. Data for previous years have been adjusted on a comparable basis.

E Estimate. Latest year reflects Administration's budget proposal.

r Revised.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a] (Continued)

Fiscal Years 1983 - 1992
(Millions of Dollars)

1986	1987	1988	1989	1990	1991[E]	1992[E]
$265,480	$273,966	$281,935	$294,880	$289,755	$287,451	$283,045
$ 76,517	$ 80,744	$ 77,166	$ 81,620	$ 80,972	$ 79,098	$ 74,300
30,828	32,956	28,246	27,569	26,142	26,269	23,133
11,730	11,473	11,676	14,503	14,851	14,187	12,593
9,501	9,316	8,878	10,587	11,016	10,889	11,319
4,343	4,962	4,727	4,384	3,873	3,836	3,342
1,933	2,111	2,250	1,993	2,003	1,748	1,617
18,182	19,926	21,389	22,585	23,088	22,168	22,296
71,511	72,020	76,337	80,676	75,622	78,938	77,848
63,139	63,810	67,642	71,571	66,541	69,435	68,688
8,373	8,210	8,694	9,104	9,081	9,503	9,160
(d)	(d)	(d)	(d)	(d)	(d)	(d)
—	—	—	—	—	—	—
32,283	33,596	34,792	37,002	37,458	35,542	37,841
75,288	76,205	84,475	87,001	88,340	86,192	85,723
5,067	5,853	5,874	5,275	5,080	4,592	4,948
2,819	2,908	3,082	3,257	3,501	3,336	3,419
1,995	2,640	210	50	(1,218)	(248)	(1,033)

FEDERAL PRICE DEFLATORS FOR GNP, DEFENSE, PPI, AND CPI

(1963 - 1992)

Year	GNP		Federal Government Defense Purchases		PPI, Capital Equipment	CPI, (Urban) All Items
	FY GNP (FY 1982 = 100)	CY GNP (CY 1982 = 100)	Durable Goods (FY 1982 = 100)	Goods & Services (CY 1982 = 100)	(CY 1982 = 100)	(CY 82-84 = 100)
1963	32.58	32.4	NA	NA	33.1	30.6
1964	33.05	32.9	NA	NA	33.4	31.0
1965	33.75	33.8	NA	NA	33.8	31.5
1966	34.74	35.0	NA	NA	34.6	32.4
1967	35.93	35.9	NA	NA	35.8	33.4
1968	37.19	37.7	NA	NA	37.0	34.8
1969	39.20	39.8	NA	NA	38.3	36.7
1970	41.48	42.0	NA	NA	40.1	38.8
1971	43.66	44.4	NA	NA	41.7	40.5
1972	46.06	46.5	48.5	41.8	42.8	41.8
1973	48.35	49.5	49.4	45.3	44.2	44.4
1974	52.16	54.0	51.6	50.6	50.5	49.3
1975	57.52	59.3	56.0	55.6	58.2	53.8
1976	62.08	63.1	59.6	59.3	62.1	56.9
1977	67.03	67.3	63.9	63.4	66.1	60.6
1978	71.72	72.2	67.3	67.8	71.3	65.2
1979	77.90	78.6	73.2	74.2	77.5	72.6
1980	84.74	85.7	81.1	83.4	85.8	82.4
1981	93.21	94.0	90.8	92.9	94.6	90.9
1982	100.00	100.0	100.0	100.0	100.0	96.5
1983	104.23	103.9	104.3	103.6	102.8	99.6
1984	108.19	107.7	108.4	107.2	105.2	103.9
1985	111.53	110.9*r*	108.0	109.2	107.5	107.6
1986	113.82*r*	113.8	108.8	110.2	109.7	109.6
1987	117.43*r*	117.4	103.9*r*	111.1	111.7	113.6
1988	121.33*r*	121.3	100.7*r*	114.0	114.3	118.3
1989	126.31	126.3	101.5	117.5	118.8	124.0
1990	131.61	131.5	100.6	121.2	122.9	130.7
1991*E*	137.41	137.4	NA	NA	NA	NA
1992*E*	142.83	142.8	NA	NA	NA	NA

Source: Bureau of Economic Analysis, "Current Business Statistics" (Monthly) and Price Measurement Branch; Council of Economic Advisers, "Economic Report of the President" (Annually); and Office of Management and Budget, "The Budget of the United States Government" (Annually).

E Estimate.

NA Not Available.

r Revised.

Key: CY = Calendar Year.
PPI = Producer Price Index for Capital Equipment.
CPI = Consumer Price Index, All Items, All Urban Consumers for 1978 and subsequent years. Previous years, All Urban Wage Earners.

FEDERAL PRICE DEFLATORS FOR AEROSPACE INDUSTRY

Calendar Years 1966 - 1990

Year	Aerospace Deflators[a] (CY 1982 = 100)						
	Com-posite	SIC 3721	SIC 3724	SIC 3728	SIC 3761	SIC 3764	SIC 3769
1966	31.2	35.7	28.5	32.8	31.9	28.1	29.2
1967	32.3	33.1	29.3	33.6	33.4	29.0	30.1
1968	33.3	34.2	29.9	34.5	34.8	29.5	31.0
1969	34.6	35.6	31.3	35.6	36.1	30.9	32.4
1970	36.6	37.7	32.9	37.4	38.1	32.5	34.2
1971	38.0	39.3	34.2	38.8	39.7	33.7	35.7
1972	38.4	44.5	35.3	43.4	42.5	35.4	38.1
1973	42.9	45.9	36.3	45.2	42.2	36.6	39.5
1974	47.2	49.9	41.0	52.2	44.5	41.7	44.0
1975	53.0	53.8	49.6	61.2	48.4	50.6	52.2
1976	58.0	58.8	53.9	67.0	53.9	55.4	56.7
1977	62.1	62.6	57.6	69.6	59.5	59.9	61.4
1978	65.4	66.1	64.1	65.5	65.0	65.4	66.1
1979	72.3	72.8	71.5	69.9	74.6	72.0	72.7
1980	80.3	81.2	77.8	77.4	84.4	80.8	80.9
1981	90.4	90.0	90.4	88.8	93.2	92.1	89.5
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	104.9	105.2	105.0	104.2	105.5	104.4	102.8
1984	113.6	118.0	115.1	111.0	107.8	105.9	110.8
1985	111.5	112.2	116.4	112.0	109.6	106.2	116.5
1986	112.0	112.1	116.5	116.1	108.5r	105.1r	115.3r
1987	111.5	111.4	117.3	118.6	105.2r	101.9r	111.8r
1988	113.4	113.9	120.8	122.5	99.6	96.5	105.9
1989	119.6	123.6	124.1	126.7	99.1	96.0	105.3
1990	124.4	130.2	131.1	130.3	98.5	95.4	105.7

Source: Aerospace Industries Association, based on data from: Bureau of Labor Statistics, Producer Price Indices; Bureau of Economic Analysis, Implicit Price Deflators; and International Trade Administration.

NOTE: Beginning in 1987 deflators for SICs 3761, 3764, & 3769 based on SIC 376.

a The Commerce Department has discontinued its reporting of the Aerospace Deflators with 1986. AIA has computed the latest years and revised years since 1985 for consistency.

r Revised.

Key: SIC = Standard Industrial Classification, SIC 3721 = Aircraft; SIC 3724 = Aircraft Engines and Engine Parts; SIC 3728 = Aircraft Parts; SIC 3761 = Missiles and Space Vehicles; SIC 3764 = Space Propulsion; SIC 3769 = Space Equipment not elsewhere classified.

91-92
Aircraft Production

In 1990, industry sales of aircraft, engines and parts not only set a new record but topped the prior record by an impressive 23 percent. Sales totaled $66.3 billion, up from $53.8 billion in the previous year.

The 1990 sales volume was compounded of increases in both the U.S. Government (military aircraft) and non-government (principally commercial aircraft) business segments. Sales to the U.S. Government came to $24.6 billion, an anomalous increase of $3.3 billion over 1989 (military aircraft sales had been expected to decline slightly due to budget reductions). Despite the gain, military sales remained far below the level of non-government sales, which reached an all-time high of $41.7 billion with a $9.2 billion gain over 1989, the largest single-year increase in history.

The industry delivered 2,268 civil aircraft and 1,062 military aircraft for a total of 3,330; the latter figure compares with 3,709 in 1989.

Civil aircraft production, including domestic and export shipments, consisted of 521 commercial transports (up from 398), 603 helicopters (up from 515), and 1,144 general aviation aircraft (down from 1,535). Civil production was actually down by 180 units, but the total dollar value ($24.5 billion) represented an increase of nearly 43 percent over 1989 ($17.1 billion). Sales of transport aircraft ($22.2 billion) accounted for more than 90 percent of the 1990 total.

Orders for aircraft, engines and parts dropped significantly in 1990, down to $81.8 billion from 1989's $96.6 billion. U.S. Government orders fell by more than $10 billion ($15 billion in 1990 compared with $25.4 billion in 1989). There was also, for the first time since 1982, a decline in non-government

orders, from $71.2 billion in 1989 to $66.8 billion in 1990. The latter decline was not indicative of a new trend; the volume failed to match the tremendous flood of orders experienced in 1989 but it nonetheless represented the second highest level of new business in history.

The backlog of orders reached its highest-ever peak despite a significant drop in the U.S. Government backlog. The overall backlog, as of December 31, 1990, was $174 billion, up from $159.2 billion in 1989. The total included $147.8 billion in non-government orders (up $25 billion) and $26.2 billion in government orders (down $10 billion).

Among other 1990 aircraft production highlights:

- Commercial transport sales increased sharply for the sixth straight year, to $22.2 billion from 1989's $15.1 billion. The year-end backlog for commercial transports was $112.3 billion, compared with $89.1 billion at the end of the previous year. Foreign orders amounted to $71.2 billion or 63 percent of the total backlog.

- Sales of civil helicopters, at $254 million, were up slightly over 1989's $251 million.

- Although shipments of general aviation aircraft declined by 391 units, the total dollar value increased to more than $2 billion from 1989's $1.8 billion.

- The 1,062 military aircraft produced included 674 delivered to U.S. military agencies and 388 exported under Foreign Military Sales (FMS) programs or direct sales by U.S. manufacturers to foreign governments. The comparable figures for 1989 were 614 delivered to U.S. agencies and 647 exported.

SALES OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't	Other	U.S. Gov't	Other	U.S. Gov't	Other
CURRENT DOLLARS							
1976	$15,936	$ 8,314	$ 7,622	$ 6,336	$ 5,900	$1,978	$ 1,722
1977	16,378	8,848	7,530	6,855	5,670	1,993	1,860
1978	19,305	8,724	10,581	6,853	7,873	1,871	2,708
1979	24,672	8,649	16,023	6,378	12,701	2,271	3,322
1980	29,524	9,427	20,097	6,724	15,901	2,703	4,196
1981	33,574	12,047	21,527	8,197	16,877	3,850	4,650
1982	31,886	15,120	16,766	10,903	12,316	4,217	4,450
1983	35,879	17,074	18,805	12,898	14,419	4,176	4,386
1984	37,285	20,216	17,069	15,136	13,121	5,080	3,948
1985	43,940	21,899	22,041	17,783	16,466	4,116	5,575
1986	47,757	22,755	25,002	18,788	19,177	3,967	5,825
1987	49,062	23,769	25,293	18,131	18,899	5,638	6,394
1988	50,742	21,316	29,426	15,278	20,433	6,038	8,993
1989[r]	53,825	21,371	32,454	15,340	23,056	6,031	9,398
1990	66,335	24,642	41,693	19,002	30,954	5,640	10,739
CONSTANT DOLLARS (1982 = 100)[a]							
1976	$27,476	$14,334	$13,141	$10,924	$10,172	$3,410	$ 2,969
1977	26,374	14,248	12,126	11,039	9,130	3,209	2,995
1978	29,516	13,339	16,179	10,479	12,038	2,861	4,141
1979	34,124	11,963	22,162	8,822	17,567	3,141	4,595
1980	36,767	11,740	25,027	8,374	19,802	3,366	5,225
1981	37,139	13,326	23,813	9,067	18,669	4,259	5,144
1982	31,886	15,120	16,766	10,903	12,316	4,217	4,450
1983	34,203	16,276	17,927	12,296	13,745	3,981	4,181
1984	32,821	17,796	15,026	13,324	11,550	4,472	3,475
1985	39,408	19,640	19,768	15,949	14,768	3,691	5,000
1986	42,640	20,317	22,323	16,775	17,122	3,542	5,201
1987	44,002	21,317	22,684	16,261	16,950	5,057	5,735
1988	44,746	18,797	25,949	13,473	18,019	5,325	7,930
1989[r]	45,004	17,869	27,135	12,826	19,278	5,043	7,859
1990	53,324	19,809	33,515	15,275	24,883	4,534	8,633

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).
a Based on revised aerospace composite price deflator.
r Revised.

ORDERS AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1976 - 1990
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't	Other	U.S. Gov't	Other	U.S. Gov't	Other
NET NEW ORDERS							
1976	$ 17,923	$ 9,513	$ 8,410	$ 7,498	$ 6,316[a]	$2,015	$ 2,094[a]
1977	20,562	9,369	11,193	6,507	8,406	2,862	2,787
1978	28,111	11,150	16,961	9,055	14,229	2,095	2,732
1979	39,457	8,762	30,695	8,762	25,084[a]	2,348	5,611[a]
1980	34,678	16,555	18,123	11,606	14,427	4,949	3,696
1981	34,857	16,946	17,911	11,760	12,621	5,186	5,290
1982	34,138	20,547	13,591	15,978	10,540	4,569	3,051
1983	38,599	22,171	16,428	17,402	11,688	4,769	4,740
1984	47,102	25,829	21,273	19,228	18,148	6,601	3,125
1985	49,942	23,751	26,191	20,062	20,153	3,689	6,038
1986	47,957	21,642	26,315	17,361	20,083	4,281	6,232
1987	52,347	17,019	35,328	12,742	26,411	4,277	8,917
1988	82,148	19,611	62,537	12,862	46,393	6,749	16,144
1989[r]	96,591	25,421	71,170	20,172	56,016	5,249	15,154
1990	81,801	15,024	66,777	10,058	54,525	4,966	12,252
BACKLOG AS OF DECEMBER 31							
1976	$ 20,879	$11,950	$ 8,929	$ 9,905	$ 7,416	$2,045	$ 1,513
1977	25,063	12,471	12,592	9,557	10,152	2,914	2,440
1978	33,869	14,897	18,972	11,759	16,508	3,138	2,464
1979	50,484	17,316	33,168	13,331	27,955	3,985	5,213
1980	57,235	17,435	39,800	12,702	33,258	4,733	6,542
1981	56,314	21,292	35,022	15,626	27,683	5,666	7,339
1982	58,564	26,644	31,920	20,626	25,980	6,018	5,940
1983	60,372	30,688	29,684	24,091	23,377	6,597	6,307
1984	70,189	36,312	33,877	28,183	28,404	8,129	5,473
1985	76,191	38,150	38,041	30,462	32,091	7,688	5,950
1986	76,391	37,041	39,350	29,035	32,997	8,006	6,353
1987	80,015	30,323	49,692	23,645	40,849	6,678	8,843
1988	111,280	28,412	82,868	21,083	66,782	7,329	16,086
1989[r]	159,150	36,320	122,830	29,182	102,814	7,138	20,016
1990	174,066	26,231	147,835	19,528	126,305	6,703	21,530

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).
a AIA estimate, based on MQ37D data.
r Revised.

U.S. AIRCRAFT PRODUCTION—CIVIL

Calendar Years 1969 - 1990

Year	TOTAL	Domestic Shipments			Export Shipments		
		Transports[a]	Helicopters	General Aviation	Transports	Helicopters	General Aviation
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,460	176	570	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617
1982	5,085	111	333	3,326	121	254	940
1983	3,356	133	187	2,172	129	216	519
1984	2,999	102	143	2,013	83	233	425
1985	2,691	126	247	1,545	152	137	484
1986	2,156[r]	171	120[r]	1,031	159	210	464
1987	1,800	187	116	598	170	242	487
1988	1,949	206	103	500	217	280	643
1989	2,448	138	221	225[r]	260	294	1,310[r]
1990	2,268	215	254	335	306	349	809

Source: Aerospace Industries Association, based on company reports; General Aviation Manufacturers Association; and Department of Commerce, International Trade Administration.

a Prior to 1976, includes the C-130 military transport.

r Revised.

U.S. AIRCRAFT PRODUCTION—MILITARY

Calendar Years 1969 - 1990

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS[a]	Direct[b]
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,047	625	422	194	228
1981	1,062	703	359	215	144
1982	1,159	690	469	68	401
1983	1,053	766	287	70	217
1984	936	561	375	71	304
1985	919	643	276	134	142
1986	1,107	708	399	110	289
1987	1,210	725	485	133	352
1988	1,305	687	618	138	480
1989[r]	1,261	614	647	92	555
1990	1,062	674	388	99	289

Source: Aerospace Industries Association, based on USAF, USN, and USA survey responses and Department of Commerce, International Trade Administration.

a Also includes acceptances of NATO AWACS aircraft.

b Military aircraft exported via commercial contracts, directly from manufacturers to foreign governments.

NA Not available.

r Revised.

CIVIL AIRCRAFT SHIPMENTS

Calendar Years 1976 - 1990

Year	TOTAL	Transport Aircraft[a]	Helicopters	General Aviation
NUMBER OF AIRCRAFT SHIPPED				
1976	16,429	222	757	15,450
1977	17,913	155	848	16,910
1978	18,962	241	904	17,817
1979	18,460	376	1,029	17,055
1980	13,634	387	1,366	11,881
1981	10,916	387	1,072	9,457
1982	5,085	232	587	4,266
1983	3,356	262	403	2,691[b]
1984	2,999	185	376	2,438
1985	2,691	278	384	2,029
1986	2,155[r]	330	330[r]	1,495
1987	1,800	357	358	1,085
1988	1,949	423	383	1,143
1989	2,448	398	515	1,535
1990	2,268	521	603	1,144
VALUE—Millions of Dollars				
1976	$ 4,592	$ 3,078	$285	$1,229
1977	4,451	2,649	251	1,551
1978	6,458	4,308	328	1,822
1979	10,644	8,030	403	2,211
1980	13,058	9,895	656	2,507
1981	13,223	9,706	597	2,920
1982	8,610	6,246	365	1,999
1983	9,773	8,000	303	1,470[b]
1984	7,717	5,689	330	1,698
1985	10,385	8,448	506	1,431
1986	11,858[r]	10,308	288[r]	1,262
1987	12,148	10,507	277	1,364
1988	15,855	13,603	334	1,918
1989	17,129	15,074	251	1,804
1990	24,477	22,215	254	2,008

Source: Aerospace Industries Association, based on company reports and General Aviation Manufacturers' Association.

a U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the four-engine turboprop-powered Lockheed L-100.

b Includes 3 off-the-shelf Gulfstream-G-III's delivered to the U.S. Air Force for C-20 VIP transports.

r Revised.

CIVIL TRANSPORT AIRCRAFT BACKLOG[a]

As of December 31, 1986 - 1990

Company and Model	1986	1987	1988	1989	1990
TOTAL AIRCRAFT ON ORDER					
(Domestic and Foreign Orders)	660	824	1,373	1,989	2,138
Value (Millions of Dollars)	$22,264	$32,401	$58,474	$89,069	$112,339
Boeing—TOTAL	451	573	937	1,440	1,563
B-737	269	342	488	739	754
B-747	84	120	153	165	250
B-757	63	67	205	344	333
B-767	35	44	91	192	192
B-777	—	—	—	—	34
Lockheed—TOTAL	—	2	1	—	—
L-100	—	2	1	—	—
McDonnell Douglas—TOTAL	209	249	435	549	575
DC-10	6	7	1	—	—
MD-11	—	29	88	126	175
MD-80	203	213	346	423	400
TOTAL FOREIGN ORDERS	293	420	840	1,092	1,205
Value (Millions of Dollars)	$12,467	$20,196	$39,504	$54,956	$ 71,213
Boeing—TOTAL	192	293	547	750	872
B-737	93	137	263	359	412
B-747	68	95	124	141	211
B-757	9	28	91	119	125
B-767	22	33	69	131	124
B-777	—	—	—	—	—
Lockheed—TOTAL	—	2	—	—	—
L-100	—	2	—	—	—
McDonnell Douglas—TOTAL	101	125	293	342	333
DC-10	2	3	1	—	—
MD-11	—	27	75	96	131
MD-80	99	95	217	246	202

Source: Aerospace Industries Association, based on company reports.

a Unfilled firm orders for U.S.-manufactured transport aircraft over 33,000 pounds (including the turboprop-powered Lockheed L-100) excluding options, but including new transports contracted for lease from the manufacturer.

SHIPMENTS OF CIVIL TRANSPORT AIRCRAFT[a]

Calendar Years 1986 - 1990

Company and Model	1986	1987	1988	1989	1990
TOTAL					
Number of Aircraft Shipped	330	357	423	398	521
Value (Millions of Dollars)	$10,308	$10,507	$13,690	$15,074	$22,215
Boeing—TOTAL	238	257	289	279	379
B-737	141	161	165	146	174
B-747	35	23	24	45	68
B-757	35	40	48	51	77
B-767	27	33	52	37	60
Lockheed—TOTAL	1	2	5	—	—
L-100	1	2	5	—	—
McDonnell Douglas—TOTAL	91	98	129	119	142
DC-10	5	3	8	1	—
MD-11	—	—	—	—	3
MD-80	86	95	121	118	139

Source: Aerospace Industries Association, based on company reports.
a U.S.-manufactured fixed-wing aircraft over 33,000 lbs.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT[a]

On Order or in Production as of 1990

Number of Engines and Crew, and Model Designation[b]	Initial Service	Standard Mixed Class	Operating Empty Weight (000's lbs)	Maximum Takeoff Gross Weight (000's lbs)	Range (Nautical Miles)[c]	Engine Manufacturer[d] and Model
FOUR ENGINES/CREW OF 3						
747-300B*	1983	400-490	383	833	7,310	P&W JT9D-7R4G2
747-400*	1988	412-509	390	870	8,380	GE CF6-80C2
THREE ENGINES/CREW OF 3						
MD-11*	1989	293-410	288	618	7,980	GE CF6-80C2-DF1, RR Trent-685, or P&W PW4360
MD-11ER*	1989	277	265	603	8,525	GE CF6-80C2-DF1 or P&W PW4360
TWO ENGINES/CREW OF 2						
737-300	1984	141	70-71	125-139	1,840 -2,950	CFMI CFM56-3-B1 or B2
737-400	1988	159	73-74	139-151	2,250	CFMI CFM56-3-B2 or CFM56-3C
737-500	1990	108-132	68	116	2,500	CFMI CFM56-3-B1 or CFM56-3C-1
757-200	1982	186-200	126	240	4,550	RR RB211-535E or P&W PW2037
767-200ER*	1982	174-290	176	315	4,566	P&W JT9D-7R4 or GE CF6-80A
767-200ER*	1984	174-290	180	351	5,942	P&W JT9D-7R4 or GE CF6-80A
767-300*	1986	204-290	190	351	4,650	P&W JT9D-7R4 or GE CF6-80A
767-300ER*	1987	204-290	196	400	6,650	P&W PW4000 or GE CF6-80C2
777*	1995	360-390	295	506	4,200	RR Trent-871, GE GE90-B1, or P&W PW4073
MD-80 series:						
MD-81	1980	155	78	140	1,630	P&W JT8D-209 or P&W JT8D-217A
MD-82	1981	155	79	150	2,176	P&W JT8D-217C
MD-83	1985	155	80	160	2,618	P&W JT8D-219
MD-87	1987	130	74	140	2,405	P&W JT8D-217C
MD-88	1987	155	79	150	2,176	P&W JT8D-217C

Source: Aerospace Industries Association, based on company reports and Aviation Week & Space Technology, "Aerospace Forecast & Inventory" (Annually).

a All jet-powered passenger transport aircraft 33,000 pounds or more empty weight.

b The Boeing Company manufacturers models: 737, 747, 757, 767, & 777 and McDonnell Douglas Corporation manufactures models: MD-80 and MD-11.

c Full passenger load and baggage.

d P&W = Pratt & Whitney; GE = General Electric; RR = Rolls-Royce; CFMI = General Electric Snecma.

* Wide-body aircraft.

SPECIFICATIONS OF U.S. CIVIL HELICOPTERS

In Production as of 1990

Company	Commercial Model	Number of Places	Useful Load (Lbs.)	Range with Useful Load (N.Miles)	External Cargo Payload (Lbs.)
Bell Helicopter Textron	212	15	5,228	231	5,000
	214 Series	16	7,889	457	7,900
	412	15	5,430	402	11,900
Enstrom Helicopter	F-28 Series	3	1,030	228	1,000
	280 Series	3	1,015	260	1,000
McDonnell Douglas Helicopter	500 Series	5	1,559	367	2,000
	530 Series	5	1,536	275	2,000
Robinson Helicopter	R22	2	546	209	—
Schweizer Aircraft	300C	3	950	232	1,050
Sikorsky Aircraft	S-76B	14	5,059	357	3,300

Source: Helicopter Association International, "1991 Helicopter Annual" (Annually).

CIVIL HELICOPTER SHIPMENTS[a]

Calendar Years 1986 - 1990

Company and Model	1986	1987	1988	1989	1990
CIVIL SHIPMENTS	330r	358	383	515	603
Value (Millions of Dollars)	$288r	$277	$334	$251	$254
Bell—TOTAL	125	127	62	22	16
206 series[b]	67	74	—	—	—
212	11	11	13	3	1
214 series	15	13	18	2	1
222	20	12	11	—	—
412	12	17	20	17	14
Enstrom—TOTAL	10	12	17	24	27
F-28 series	3	7	7	6	12
280 series	7	5	10	18	15
Hynes—TOTAL	4r	—	—	—	—
H5T	4r	—	—	—	—
McDonnell Douglas—TOTAL	65	41	44	73	77
269 series	1	—	—	—	—
500 series	40	37	39	64	65
530 series	24	4	5	9	12
Robinson—TOTAL	90	127	204	310	384
R22	90	127	204	310	384
Schweizer—TOTAL	23	37	45	69	83
300C	23	37	45	69	83
Sikorsky—TOTAL	13	14	11	17	16
S-76	10	13	11	17	16
S-70C series	3	1	—	—	—

Source: Aerospace Industries Association, based on company reports.
NOTE: All data exclude production by foreign licensees.
a Domestic and export helicopter shipments for non-military use. Helicopters in military configuration exported to foreign governments and purchased under commercial contract are reported elsewhere. Models which may be shipped in either a civil or a military configuration appear in both tables.
b Bell Helicopter moved production of its 206 series helicopters to its Canadian facility in 1987.
r Revised.

DIRECT EXPORT SHIPMENTS OF MILITARY HELICOPTERS[a]

Calendar Years 1986 - 1990

Manufacturer and Model	1986	1987	1988	1989	1990
DIRECT MILITARY EXPORT SHIPMENTS	11	21	66	46	48
Value (Millions of Dollars)	$88	$57	$352	$278	$337
Bell AH-1S	—	—	24	26	—
Boeing Vertol CH-47/414/352	7	4	1	—	11
McDonnell Douglas 500MD (TOW)/ 500 Scout	—	11	19	—	—
Schweizer 300C	4	6	—	—	—
Sikorsky S-70C	—	—	13	17	35
Sikorsky S-80M	—	—	—	3	2
Sikorsky MH53	—	—	9	—	—

Source: Aerospace Industries Association, company reports.

a Shipments of helicopters in military configuration exported directly from U.S. manufacturers to foreign governments. Military helicopters exported via Foreign Military Sales (FMS) are reported with Dept. of Defense (DoD) aircraft acceptance data elsewhere in this chapter. Some models reported on this page may be shipped in either military or civil configuration; see Civil Helicopter Shipments table for additional data.

GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers
Calendar Years 1986 - 1990

	1986	1987	1988	1989	1990
NUMBER OF AIRCRAFT SHIPPED	1,495	1,085	1,143	1,535	1,144
Single-Engine, Piston	985	613	628	1,023	608
Multi-Engine, Piston	138	87	67	87	87
Turboprop	250	263	291	268	281
Turbojet	122	122	157	157	168
VALUE OF SHIPMENTS[a] (Millions of Dollars)	$1,262	$1,364	$1,918	$1,804	$2,008
Single-Engine, Piston	$ 80	$ 80	$ 66	$ 104	$ 68
Multi-Engine, Piston	43	18	12	24	24
Turboprop	430	477	596	524	644
Turbojet	709	789	1,242	1,149	1,272
Number of Aircraft By Selected Manufacturer					
American General	NA	NA	NA	NA	10
Beech	305	314	372	371	433
Bellanca	NA	NA	NA	7	4
Cessna	549	187	161	183	171
Christen	NA	NA	NA	75	68
Classic	NA	NA	NA	NA	8
Fairchild	37	36	29	12	14
Gates Learjet	20	16	23	25	25
Gulfstream	26	30	51	40	34
Lake	26	23	28	23	17
Maule	64	54	55	35	28
Mooney	142	143	142	143	147
Piper	326	282	282	621	178
Taylorcraft	NA	NA	NA	NA	7

Source: General Aviation Manufacturers' Association.
a Manufacturers' net billing price.
NA Not available.

MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES

Number and Flyaway Value
Calendar Years 1976 - 1990

Year	TOTAL	Bomber/ Patrol/ Command/ Control	Fighter/ Attack	Trans- port/ Tanker	Trainer	Heli- copter	Other
NUMBER							
1976	1,143	55	646	67	11	348	16
1977	862	44	488	25	12	273	20
1978	723	30	478	28	—	166	21
1979	734	17	529	16	—	158	14
1980	819	16	551	15	18	189	30
1981	918	19	649	17	60	158	15
1982	758	26	478	14	60	172	8
1983	836	34	421	22	120	233	6
1984	632	34	298	18	30	240	12
1985	777	34	409	25	—	306	3
1986	818	52	424	76	—	266	—
1987	858	74	483	36	—	235	—
1988	842	55	509	31	—	247	—
1989r	706	24	408	21	—	253	—
1990	773	24	451	38	—	260	—
FLYAWAY VALUE—Millions of Dollars							
1976	$ 4,729	$ 547	$3,421	$ 340	$27	$ 384	$10
1977	4,364	499	3,190	331	14	316	14
1978	4,664	689	3,496	237	—	225	17
1979	5,470	442	4,660	136	—	219	13
1980	6,514	475	5,282	178	32	516	31
1981	8,446	526	6,518	509	32	825	19
1982	8,605	886	6,383	410	42	872	12
1983	9,640	1,259	6,708	575	79	1,009	10
1984	9,308	1,270	5,774	627	18	1,597	22
1985	14,122	3,640	7,923	838	—	1,715	6
1986	20,903	8,177	8,004	2,665	—	2,057	—
1987	21,459	8,569	8,900	2,218	—	1,772	—
1988	16,031	2,911	8,953	2,314	—	1,853	—
1989r	11,968	1,423	7,735	743	—	2,067	—
1990	13,249	1,458	8,831	759	—	2,201	—

Source: Aerospace Industries Association, based on USAF, USN, and USA survey responses.
NOTE: Data represent new U.S.-manufactured aircraft, excluding gliders and targets. Values include spares, spare parts, and support equipment that are procured with the aircraft. Includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES AIR FORCE[a]

Calendar Years 1989 - 1990
(Costs in Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1989	1990	1989	1990	1989	1990
AIR FORCE—TOTAL	234r	297	$4,452r	$5,422	NA	NA
Fighter/Attack—TOTAL	194r	236	$3,209r	$4,074	$3,921	NA
F-15	36r	36	1,220r	1,254	1,446	NA
F-16	158	200	1,989	2,820	2,475	NA
Bombers—TOTAL	1	1	409	424	NA	NA
B-2A	1	1	409	424	NA	NA
Transports/Tankers—TOTAL	21	38	743	759	746	NA
C-5B	5	—	458	—	459	—
C-130H	16	38	285	759	287	NA
Helicopters—TOTAL	18	22	91	165	150	NA
MH-60G	18	22	91	165	150	NA

Source: Department of the Air Force.
NOTE: Costs shown are approximate. Calendar year acceptances may derive from procurement quantities funded in more than one fiscal year.
a Air Force acceptances for own use; excludes FMS MAP shipments.
b Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, and non-recurring costs associated with the manufacture of aircraft.
c Weapon system cost includes flyaway costs, peculiar ground equipment, training equipment, and technical data.
NA Not available.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES ARMY[a]

Calendar Years 1989 - 1990
(Costs in Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1989	1990	1989r	1990	1989	1990
ARMY—TOTAL	184	168	$1,365	$1,283	$1,691	$1,468
Helicopters—TOTAL	184	168	$1,365	$1,283	$1,691	$1,468
UH-60A	72	72	396	372	461	427
AH-64	112	96	969	911	1,230	1,041

Source: Department of the Army.
a Army acceptances for own use; excludes FMS MAP shipments.
b Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.
c Weapon System Cost includes flyaway cost, initial spares, ground equipment, training equipment and other support items.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES NAVY[a]

Calendar Years 1989 - 1990
(Costs in Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1989[r]	1990	1989[r]	1990	1989[r]	1990
NAVY—TOTAL	196	209	$4,581	$5,190	$5,557	$6,911
Patrol—TOTAL	23	23	$1,014	$1,034	$1,190	$1,364
E-2C	6	7	254	341	278	432
E-6A	5	4	412[E]	330[E]	458[E]	366[E]
EA-6B	12	12	349	363	454	566
Fighter/Attack—TOTAL	133	134	3,017	3,508	3,692	4,618
F-14A	17	15	570	683	755	1,172
F/A-18	76	89	1,878	2,308	2,198	2,654
AV-8B	39	24	550	378	693	520
A-6E	1	6	19	139	46	272
Helicopters—TOTAL	40	52	550	648	675	929
AH-1W	—	7	—	45	—	125
CH/MH-53E	14	14	208	209	267	238
HH-60H	2	3	20	32	21	35
SH-2F	3	—	24	—	35	—
SH-60B	13	9	171	121	181	176
SH-60F	8	19	127	241	171	355

Source: Department of the Navy.
a Navy acceptances for own use; excludes FMS shipments.
b Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, non-recurring costs, and ancillary equipment.
c Weapons System Cost (Investment Cost) includes flyaway cost, initial spares, ground equipment, training equipment, and other support items.
E Estimate.
r Revised.

MILITARY AIRCRAFT ACCEPTANCES FOR REIMBURSABLE PROGRAMS[a]

Calendar Years 1989 - 1990
(Costs in Millions of Dollars)

Accepting Agency, Type, and Model	Number of Aircraft Accepted		Flyaway Cost[b]	
	1989	1990	1989	1990
TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS	92	99	$1,570r	$1,354
AIR FORCE—TOTAL	57	69	$ 969	$ 973
Fighter Attack—TOTAL	57	69	969	973
F-16 C/D	57	69	969	973
NAVY—TOTAL	24	17	$ 540r	$ 314
Fighter/Attack—TOTAL	24	12	540r	276
F/A-18	24	12	540r	276
Helicopters—TOTAL	—	5	—	38
AH-1	—	5	—	38
ARMY—TOTAL	11r	13	$ 61r	$ 67
Helicopters—TOTAL	11r	13	61r	67
UH-60	11r	13	61r	67

Source: Aerospace Industries Association, based on USAF, USN, and USA survey responses.
a Foreign government aircraft purchases through the Department of Defense Foreign Military Sales program.
b Flyaway cost includes airframes, engines, electronics, communications, armament, other installed equipment, and nonrecurring costs associated with the manufacture of the aircraft.
r Revised.

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a]

Fiscal Years 1990, 1991, and 1992
(Millions of Dollars)

Agency and Model	1990		1991[E]		1992[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
AC-130U	5	$ 235.4	—	$ —	—	$ —
B-2 Stealth Bomber	2	2,063.2	2	2,348.4	4	2,911.3
C-17	4	1,198.1	—	460.0	6	1,997.6
C-20[c]	—	—	1	30.0	—	—
C-27A	5	83.2	5	79.5	—	—
C-130H Hercules	12	258.2	—	—	8	365.9
Civil Air Patrol Aircraft	38	2.5	38	1.9	27	2.0
E-8A JSTARS	—	—	—	—	—	62.7
F-15E Eagle	36	1,401.2	36	1,530.3	—	169.7
F-16 Falcon	150	2,904.6	108	2,061.9	48	1,151.3
HC-130	1	42.6	—	—	—	—
KC-135 Re-engining/Modern	36[E]	572.4[E]	29	543.8	18	426.4
MC-130H Combat Talon	2	169.2	—	—	—	—
MH-60G Pave Hawk	24	200.7	4	36.9	6	23.5
T-1A (TTTS)	14	145.1	28	155.8	46	167.4
ARMY						
AH-64 Attack Helicopter	132	$1,464.0	—	$ 91.1	—	$ 142.1
C-212 Grisly Hunter	1	19.8	—	—	—	—
CH-47 Modernization	—	289.7	—	290.9	—	256.9
OH-58D AHIP Modification	—	191.9	—	13.2	—	183.2
RC-12D Guard Rail	4	49.0	3	87.4	6	189.5
UH-60L Black Hawk[b]	72	661.1	48	104.5	60	507.5
NAVY						
AH-1W Sea Cobra	—	$ —	8	$ 79.0	12	$ 128.7
AV-8B Harrier	24	447.2	24	480.0	—	—
AX/A-12	—	1,204.4	—	—	—	—
CH/MH-53E Super Stallion	9	205.7	12	314.5	20	508.8
E-2C Hawkeye	4	299.5	6	388.6	6	509.9

(Continued on next page)

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a] (Continued)

Agency and Model	1990		1991[E]		1992[E]	
	No.	Cost	No.	Cost	No.	Cost
NAVY (Continued)						
EA-6B Prowler	—	$ 129.6	1	$ 349.4	—	$ 110.4
F-14D Tomcat	24	1,421.8	—	49.6	—	—
F/A-18 Hornet	66	1,914.8	48	1,558.9	36	1,927.3
HH-60H[b]	—	—	—	6.0	9	165.2
KC-130T	2[E]	50.0[E]	2	56.0	—	—
SH-60B Seahawk LAMPS MK-111	6	177.1	6	166.5	12	244.0
SH-60F CV ASW	—	83.0	18	271.7	12	250.5
T-44A Trainer	—	3.0	—	—	—	—
T-45 Training System	—	96.3	—	159.2	12	343.5
V-22[c]	—	—	—	165.0	—	—

Source: Department of Defense Budget, "Program Acquisition Costs by Weapon System" (Annually).
NOTE: See Research and Development Chapter for aircraft program RDT&E authorization data.
a Total Obligational Authority for procurement, excluding initial spares.
b Army, Navy, and Air Force funding.
c Navy and Air Force funding.
E Estimate. Latest year reflects Administration's budget proposal.

ACTIVE U.S. MILITARY AIRCRAFT IN CONTINENTAL U.S.[a]

Fiscal Years 1979 - 1992

Year	Total	Fixed-Wing Aircraft				Helicopter
		Total	Jet	Turboprop	Piston	
1979	18,526	11,365	8,656	1,859	850	7,161
1980	18,969	11,362	8,794	1,869	699	7,607
1981	19,363	11,645	9,111	1,943	591	7,718
1982	21,728	12,063	9,647	1,900	516	9,665
1983	18,652	11,603	9,495	1,745	363	7,049
1984	18,833	11,661	9,551	1,777	333	7,172
1985	19,333	11,929	9,640	1,881	408	7,404
1986	20,157	11,919	9,730	1,803	386	8,238
1987	20,514	12,054	9,819	1,865	370	8,460
1988	21,210	12,481	9,954	2,222	305	8,529
1989	19,223	11,938	9,501	2,131	261	7,330
1990[E]	18,606	11,540	9,220	2,062	258	7,066
1991[E]	18,417	11,528	9,273	1,999	256	6,889
1992[E]	18,008	11,142	8,960	1,937	245	6,866

Source: Office of the Secretary of Defense, as reported in "FAA Aviation Forecasts" (Annually).
a Includes Army, Air Force, Navy, and Marine regular service aircraft; as well as Reserve and National Guard Aircraft.
E Estimate.

DEPARTMENT OF DEFENSE
OUTLAYS FOR AIRCRAFT PROCUREMENT

By Agency
Fiscal Years 1962 - 1993
(Millions of Dollars)

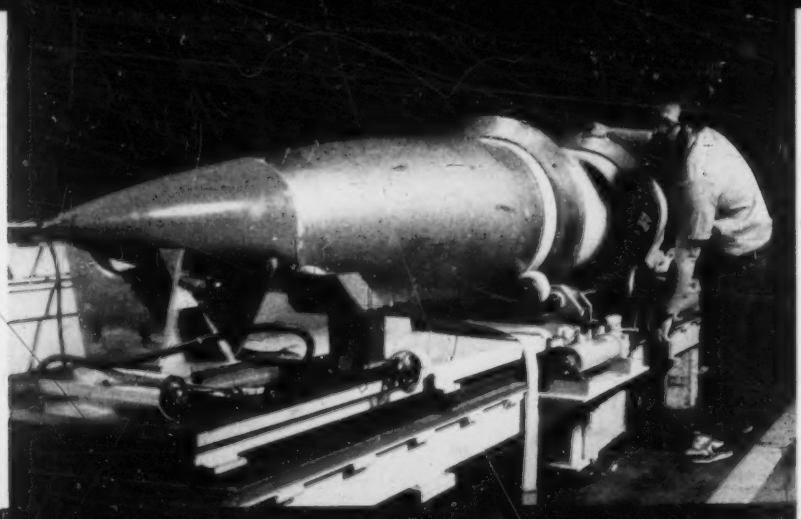
Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1962	$ 6,659	$ 4,387	$ 2,102	$ 170
1963	6,309	3,747	2,328	234
1964	6,053	3,894	1,859	300
1965	5,200	3,115	1,739	346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr.Qtr.	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	787
1981	13,193	7,941	4,397	855
1982	16,793	9,624	5,872	1,297
1983	21,013	11,799	7,490	1,724
1984	23,196	12,992	8,040	2,165
1985	26,586	15,619	8,263	2,705
1986	30,828	18,919	8,922	2,987
1987	32,956	20,036	9,614	3,306
1988	28,246	15,961	9,407	2,878
1989	27,569	14,662	10,073	2,834
1990	26,142	14,303	9,031	2,808
1991[E]	26,269	14,572	8,747	2,950
1992[E]	23,133	13,278	7,772	2,084
1993[E]	20,488	11,509	7,235	1,744

Source: Office of Management and Budget, "Budget of the United States Government" (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

SPECIFICATIONS OF U.S. MILITARY AIRCRAFT
ON ORDER OR IN PRODUCTION AS OF 1990

Primary Mission, DOD Designation, & Popular Name	Manufacturer	U.S. Military Service	Crew	Empty Weight (000's lbs)	Engines	Performance Typical for Primary Mission	Remarks
ATTACK							
A-6E Intruder	Grumman	USN/USMC	2	27	2xP&W J52	Mach 0.8 at sea level	Also EA-6A/B & KA-6D
AV-8B Harrier 2	MDC/BAe	USMC	1	13	1xRR F402	Mach 0.91	Graphite/epoxy super-critical wing
BOMBERS							
B-2 Stealth Bomber	Northrop	USAF	2-3		4xGE F118		Radar eluding tactical bomber
ELECTRONIC WARFARE							
EA-6B Prowler	Grumman	USN/USMC	4	33	2xP&W J52	493 n.m. standoff radius	Tactical jamming system
FIGHTERS							
F-14A Tomcat	Grumman	USN	2	40	2xP&W TF30	Mach 2.3 class	Missile, gun fleet defense
F14A+ Super Tomcat	Grumman	USN	2	42	2xGE F110	Mach 2.3 class	F-14A with upgraded engines and radar
F14D	Grumman	USN	2	42	2xGE F110	Mach 2.3 class	F14A+ with improved avionics and infrared track and search system
F-15C/D Eagle	MDC	USAF	1-2	31	2xP&W F100	Mach 2.5 class	Air superiority defense, guns, missiles, 15D = 2 seat trainer
F-15E Eagle	MDC	USAF	2	32	2xP&W F100	Mach 2.5 class	Dual role fighter long range interdiction
F-16 A/B Fighting Falcon	GD	USAF	1-2	15	1xP&W F100	Mach 2+ class	Multirole fighter, fully fly-by-wire, missiles, guns
F-16 C/D Fighting Falcon	GD	USAF	1-2	16	1xP&W F100 1xGE F110	Mach 2+ class	Provisions for AMRAAM, LANTIRN, and new EW Nav Comm. Systems
F/A-18 Hornet	MDC/Northrop	USN/USMC	1	23	2xGE F404	Mach 1.7 class	Missiles, guns, also export
COMMAND/CONTROL AND PATROL							
E-2C Hawkeye	Grumman	USN	5	38	2xAll T56	6 hr. mission duration	AEW command & control, passive detection
E-6A	Boeing	USN	18	167	4xCFM56	Long endurance	AEW command & control
CARGO-TRANSPORT							
C-HC-130 Hercules	Lockheed	USAF/USN	4	74-78	4xAll T56	363 mph, 2,038 n.m.	92-128 troops or 39-43,000 lbs
C-5B Galaxy	Lockheed	USAF	6	363	4xGE TF39	Cruise 563 mph, 3,000 n.m. range	Global strategic logistics, 261,000 lb. cargo capacity
C-17A	MDC	USAF	3	270	4xP&W F117	Mach 0.77, 3,000 n.m.	102 troops or 172,000 lbs.
C-26	Fairchild	ANG	2	10	2xGA TPE-331	275 mph, 700 n.m.	8-place, pass. or cargo
TRAINING							
T-45A Goshawk	MDC/BAe	USN	2	9	1xRR F405	Mach 0.85 at 35,000 ft.	Next generation trainer
T-1A	Beech	USAF	2	11	2xP&W AJT-15D	460 kt at 35 k ft.	Tanker Transport Trainer
HELICOPTERS							
AH-1W Super Cobra	Bell-Textron	USN	2	10	2xGE T700	Max 218 mph, 395 mi	TOW, hellfire, sidewinder
AH-64 Apache	MDC	Army	2	12	2xGE T700	Max 197 mph, 445 mi	Attack helicopter
CH/MH-53E	Sikorsky	USN	3-8	33-36	3xGE T64	Max 196 mph, 710 mi	55 passengers, aux. tanks, minesweeping
HH-60H	Sikorsky	USN	4-12	14	2xGE T700	Max 135 mph, 500 mi	Strike and rescue
SH-2F Seasprite	Kaman	USN	3	7	2xGE T58	Max 160 mph, 430 mi	LAMPS Mk 1 helicopter
SH-60B Seahawk	Sikorsky	USN	3	15	2xGE T700	Max 171 mph, 640 mi	ASW
SH-60F	Sikorsky	USN	4	14	2xGE T700	Max 177 mph, 789 mi	ASW
UH-60A Black Hawk	Sikorsky	Army/USAF	3	11	2xGE T700	Max 184 mph, 373 mi	UTTAS

Source: Aviation Week & Space Technology, "Aerospace Forecast & Inventory" (Annually).
KEY: All = Allison Gas Turbine; BAe = British Aerospace; CFM = CFM International; GA = Garrett Engine; GD = General Dynamics; GE = General Electric; Lyc = Textron Lycoming; MDC = McDonnell Douglas; P&W = Pratt & Whitney; PWC = P&W of Canada; RR = Rolls Royce.



91-92
Missile Programs

Industry sales of missile systems declined slightly in 1990, as they had in each of the preceding two years. According to Bureau of the Census reports, sales of missile systems and parts (excluding propulsion units) amounted to $9.1 billion, down from $9.3 billion in 1989.

Census separately reported sales of missile propulsion systems as part of a statistical grouping that also includes propulsion units for civil and military space vehicles. In 1990, total sales in that grouping came to $3.1 billion, which compares with $3.6 billion in 1989.

Net new orders for missile systems and parts totaled $7.9 billion, down from $9 billion in the previous year; the figures do not include propulsion units. Orders for missile/space propulsion systems amounted to $3.2 billion, a very sharp drop from 1989's $6.1 billion.

The year-end backlog for missile systems and parts was $12.8 billion, down from $14 billion at the end of the previous year. The backlog for propulsion units was $6.5 billion, compared with $6.4 billion at the end of 1989.

The Department of Defense (DoD) budget plan for FY 1992 contemplated procurement of missile systems valued at $12.6 billion, down from $14.2 billion in 1991. However, the FY 1992 figure will be further reduced by Congressional and Administration actions, not finalized at publication time, involving cancellation of some major R&D programs.

Nonetheless, the DoD plan offers an approximate guideline to the scope of programs and program priorities. Under the plan as submitted to Congress, Air Force outlays for missile procurement in FY 1992 would have totaled $6.2 billion (down from $7.3 billion in 1991); the Navy's $4.3 billion

(down from $4.4 billion) and the Army's $2.2 billion (down from $2.5 billion).

Missile programs in production or operational service during 1990/91 and funded under FY 1991 appropriations include:

Air Force

The AMRAAM (Advanced Medium Range Air-to-Air Missile), $815 million; the Peacekeeper ICBM, $535 million; the Advanced Cruise Missile, $454 million; the HARM antiradiation weapon being procured by the Air Force for both USAF and Navy use, $370 million; the AGM-130 air-to-surface weapon, $38 million; the HAVE NAP Israeli-designed air-to-surface missile for standoff launch against hard targets, $25.8 million; and the SRAM II supersonic air-to-surface missile, $10 million.

Navy

The Trident II Fleet Ballistic Missile, $1.5 billion; the Tomahawk ship-launched cruise missile, $659 million; the Standard ship defense surface-to-air missile, $608 million; the Harpoon antiship missile, $241 million; the Penguin antiship missile, $44 million; and the Maverick air-to-surface weapon, $13 million.

Army

The Patriot long-range air defense missile, $736 million; the Multiple Launch Rocket System, a mobile rocket battery, $463 million; the Stinger short-range antiaircraft weapon used by all services, $252 million; the ATACMS (Army Tactical Missile System), $187 million; the TOW 2 (Army / Marine Corps antitank weapon), $185 million; the Laser Hellfire helicopter-launched antiarmor missile, $148 million; the Avenger air defense missile, $118 million; and the AAWS-M antiarmor missile, $16 million.

MISSILE PROGRAM PROCUREMENT[a]

Fiscal Years 1990, 1991, and 1992
(Millions of Dollars)

Agency and Model	1990		1991[E]		1992[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
ACM	75	$ 314.5	85	$ 454.2	120	$ 501.8
AGM-130	28	27.9	48	38.4	120	70.0
AMRAAM[b]	900	788.0	735	815.1	1,191	974.1
HARM[b]	1,838	435.5	1,440	369.5	1,214	323.9
HAVE NAP	22	23.4	26	25.8	32	34.7
Peacekeeper	12	617.3	12	534.5	—	195.2
Sidewinder[b]	—	0.5	—	0.4	—	—
SRAM II	—	10.7	—	10.1	—	11.0
NAVY						
Harpoon	125	$ 212.1	160	$ 240.5	—	$ 37.8
Hawk[e]	—	13.1	—	—	—	1.6
Maverick[b]	2,639	192.3	—	13.0	—	5.5
Penguin	24	66.3	40	44.1	42	44.4
Phoenix	420	325.5	—	—	—	—
RAM	—	2.0	—	—	—	—
Standard	710	390.2	790	607.6	525	415.2
Tomahawk	400	575.3	400	658.6	236	454.1
Trident II	41	1,399.1	52	1,483.5	28	1,195.4
ARMY						
AAWS-M[c]	—	$ —	—	$ 15.6	1213	$ 74.9
ATACMS	104	108.5	318	186.9	300	174.9
Avenger[c]	106	114.1	88	117.6	149	185.3
Chaparral	422	25.4	—	—	—	6.8
Laser Hellfire[d]	3,402	130.2	4,200	148.0	112	19.7
MLRS	40,788	506.2	36,000	462.5	—	183.3
Patriot	815	902.0	817	735.7	—	107.1
Stinger[f]	2,375	114.8	6,922	252.2	—	37.5
TOW 2[c]	9,861	125.4	11,546	185.4	10,000	200.6

Source: Department of Defense, "Program Acquisition Costs by Weapon System" (Annually).
NOTE: See Research and Development Chapter for missile program RDT&E authorization data.
a Total Obligational Authority excluding initial spares and RDT&E.
b Navy and Air Force funding.
c Army and Marine Corps funding.
d Army and Navy funding.
e Marine Corps funding.
E Estimate. Latest year reflects Administration's budget proposal.
f Army, Marine Corps, Navy, and Air Force funding.

MAJOR MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, PRODUCTION, OPERATION

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-AIR					
AMRAAM-120A	USAF/USN	D,P	Hughes/Ray	Hercules	Hughes/Ray
Phoenix-54A	USN	O	Hughes	Hercules	Hughes
Phoenix-54C	USN	P	Hughes/Ray	Hercules	Hughes/Ray
Sidewinder-9J	USAF	O	Ford Aero.	Hercules/ Aerojet	Ford Aero.
Sidewinder-9L	USN/USAF	O	NASC	Bermite/ Hercules	Raytheon/ Ford Aero.
Sidewinder-9M	USN/USAF	P	NASC	MTI/Hercules	Ray/Ford Aero.
Sidewinder-9N	USAF	O	Ford Aero.	—	Ford Aero.
Sidewinder-9P	USAF	P,O	Ford Aero.	Hercules/ Aerojet	Ford Aero.
Sidewinder-9R	USN	P	Ford Aero.	MTI/Hercules	Ray/Ford Aero.
Sparrow-7F	USN/USAF	O	NASC	Hercules	Raytheon/GD
Sparrow-7M	USN/USAF	P	Raytheon/GD	Hercules	Raytheon/GD
Sparrow-7P	USN	D	NASC	—	Raytheon
Sparrow-7R	USN	D	NASC	—	Raytheon/GD
AIR-TO-SURFACE					
ALCM-86B	USAF	P	Boeing	WI	Honeywell/ Litton
HARM-88A/B	USN/USAF	P	TI	MTI/Hercules	TI
*Harpoon-84A/C	USN	P,O	MDC	Teledyne CAE	TI/IBM/LSI/ Northrop
GBU-15	USAF	R	RI	Hughes	Hughes/RI
Maverick-65A/B	USAF	P,O	Hughes	MTI/Aerojet	Hughes
Maverick-65D	USAF	P,O	Hughes/Ray	MTI/Aerojet	Hughes/Ray
Maverick-65E	USMC	P	Hughes	MTI/Aerojet	Hughes
Maverick-65F	USN	P	Hughes/Ray	MTI/Aerojet	Hughes/Ray
Maverick-65G	USAF	P	Hughes/Ray	MTI/Aerojet	Hughes/Ray
Shrike-45A/B	USN/USAF	O	NWC/PMTC	Aerojet/ Hercules	Texas Instruments
Sidearm 1-122A	USN/USMC	P	Motorola	MM/Oirliken	Motorola
SLAM-84E	USN	P	MDC	Teledyne CAE	MDC/Hughes/RI
SRAM-69A	USAF	O	Boeing	Lockheed	Kearfott
Standard ARM-78D	USN/USAF	O	GD	NOSIH	GD
Walleye 1-62	USN	O	MM	—	MM/Hughes
Walleye 1ER-62	USN	R,D	NAC	—	NAC
Walleye 2-62	USN	O	NAC	—	NAC
Walleye 2 (ER/DL)-62	USN	O	NAC	—	NAC

*Also Surface-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-SURFACE (Cont'd.)					
AGM-130A	USAF	D	RI	Hercules	RI
AGM-130B	USAF	D	RI	Hercules	RI
ANTI-SUBMARINE					
VLA-44A	USN	O	Loral	MTI	Kearfott
SURFACE-TO-AIR					
ADATS LOS-F-H	Army	P	MM	—	GD
Chaparral-72A	Army	O	Ford Aero.	Hercules/ Bermite	GE/Raytheon
Chaparral-72E/H	Army	P,O	Ford Aero.	AR	Ford Aero.
Hawk-23B	Army	P,O	Raytheon	Aerojet	Raytheon
Patriot-104	Army	P	Raytheon	MTI	Raytheon
RAM-116A	USN	D	General Dynamics	Bermite/MTI/ Hercules	General Dynamics
Redeye-43A	Army/USMC	O	GD	AR	GD
Roland-115	Army	O	Hughes/ Boeing	Hercules Boeing	Hughes/
Sea Sparrow-7M	USN	P,O	Raytheon/GD	Aerojet/ Hercules	Raytheon/GD
Standard 1 MR	USN	P,O	GD	Aerojet/NOSIH	GD
Standard 2 MR	USN	P,O	GD	AR/Aerojet/MTI	GD
Standard 1 ER	USN	O	GD	AR/NOSIH	GD
Standard 2 ER	USN	P,O	GD/Raytheon	AR/NOSIH/MTI	GD/Raytheon
Stinger-92A	Army/USMC	P,O	GD/Raytheon	AR	GD/Raytheon
SURFACE-TO-SURFACE					
*Harpoon-84A/C	USN	P,O	MDC	Teledyne CAE/ MTI	TI/IBM/LSI/ Northrop
Minuteman 2-30F	USAF	O	AFLC	MTI/Aerojet/ Hercules	Rockwell Autonetics
Minuteman 3-30G	USAF	O	AFLC	MTI/Aerojet	Rockwell Autonetics

*Also Air-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
SURFACE-TO-SURFACE (Cont'd.)					
Peacekeeper (MX)-118A	USAF	P,O	BMC	MTI/Avco/ Aerojet/GE/ Hercules/ Rocketdyne	RI/Northrop/ Honeywell/ Litton
Poseidon C3-73A	USN	O	Lockheed	MTI/Hercules	GE/MIT/Ray/ Hughes
Tomahawk (SLCM)	USN	P	GD/MDC	WI/ARC/CSD	MDC/GD
Gryphon (GLCM)	USAF	P	GD/MDC	WI	MDC/GD
Trident 1 (C4)	USN	P,O	Lockheed	Hercules/MTI	GE/Draper/ Ray/Hughes/ Kearfott
Trident 2 (D-5)	USN	D,P	Lockheed	Hercules/MTI/ UTC	GE/Draper/ Ray/Hughes/ Kearfott/RI
BATTLEFIELD SUPPORT AND ANTIARMOR					
ATACMS	Army	P	LTV	ARC	—
Dragon-47	Army	P,O	MDC	MDC	MDC
Hellfire-114A	Army/USMC	P	RI	Hercules/MTI	MM
Lance-52C	Army	O	LTV	RI/Rocketdyne	E-Systems/ Sys-Donner/ Arma
MLRS-26,-270	Army	P,O	LTV	AR	MM
Shillelagh-51C	Army	O	Ford Aero.	Hercules	Ford Aero.
SMAW HEAA	USMC	P	MDC	MDC	—
SMAW HEDP	USMC	P,O	MDC	MDC	—
TOW-71A	Army	O	Hughes	Hercules	Emerson El.
ITOW-71C	Army	P,O	Hughes	Hercules	Emerson El.
TOW2-71D	Army	P,O	Hughes	Hercules/MTI	Emerson El./TI
TOW2A-71E	Army	P,O	Hughes	Hercules/MTI	Emerson El./TI
TOW2B-71F	Army	P	Hughes	Aerojet/Thorn	Emerson El./TI

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology" Magazine.
Status: R-Research; D-Development; P-Production; O-Operational.

Abb:
- AFLC - Air Force Logistics Cmd.
- AR - Atlantic Research
- BMO - Ballistic Missile Office
- GD - General Dynamics
- GE - General Electric
- LSI - Lear Siegler
- MM - Martin Marietta
- MDC - McDonnell Douglas
- MIT - Massachusetts Institute of Technology
- MTI - Thiokol
- NAC - Naval Avionics Center
- NASC - Naval Air Systems Command
- NOSIH - Naval Ordnance Station, Indian Head
- NWC - Naval Weapons Center
- PMTC - Pacific Missile Test Center
- Ray - Raytheon
- RI - Rockwell International
- TI - Texas Instruments
- USAF - United States Air Force
- USMC - United States Marine Corps
- USN - United States Navy
- WI - Williams International

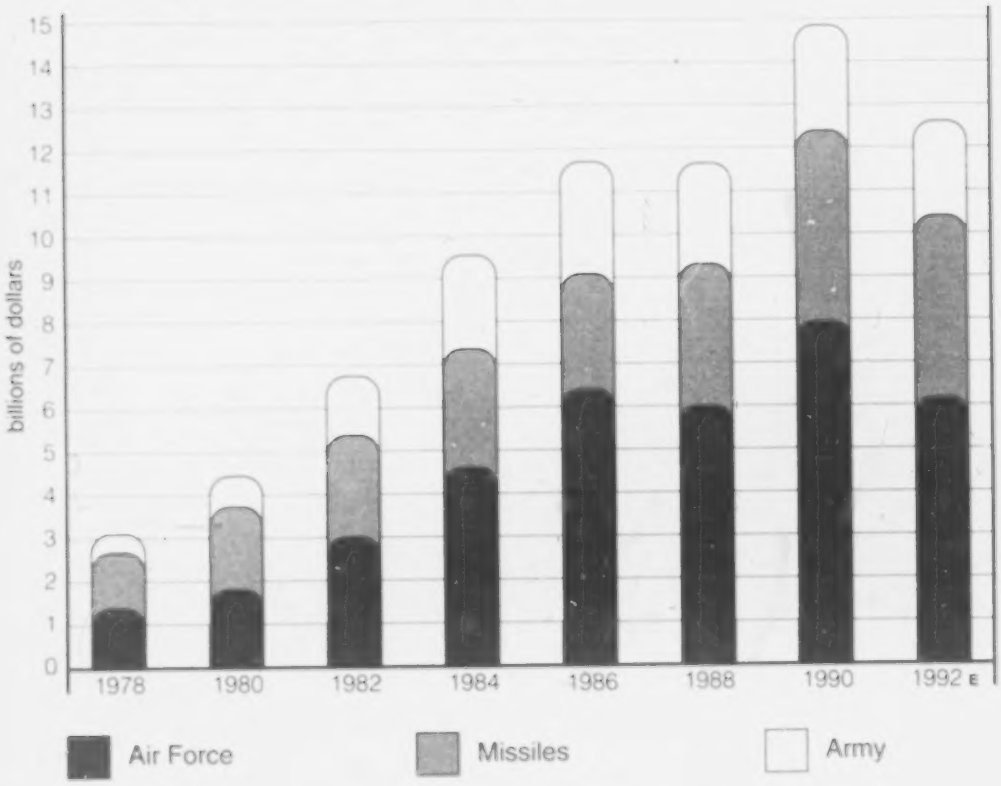
DEPARTMENT OF DEFENSE
OUTLAYS FOR MISSILE PROCUREMENT[a]

By Agency
Fiscal Years 1962 - 1992
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT[a]	Air Force	Navy[a]	Army
1962	$ 3,442	$2,385	$ 593	$ 464
1963	3,817	2,676	718	423
1964	3,577	2,100	981	496
1965	2,096	1,320	522	254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr.Qtr.	402	347	148	(93)
1977	2,781	1,501	905	374
1978	3,096	1,376	1,302	418
1979	3,786	1,537	1,702	547
1980	4,434	1,810	1,973	651
1981	5,809	2,366	2,297	1,146
1982	6,782	3,069	2,444	1,269
1983	7,795	3,383	2,812	1,600
1984	9,527	4,640	2,809	2,079
1985	10,749	5,409	2,941	2,399
1986	11,731	6,473	2,780	2,478
1987	11,473	6,002	3,157	2,314
1988	11,676	6,046	3,392	2,239
1989	14,503	7,349	4,445	2,709
1990	14,851	7,951	4,446	2,453
1991[E]	14,187	7,277	4,411	2,498
1992[E]	12,593	6,176	4,254	2,163

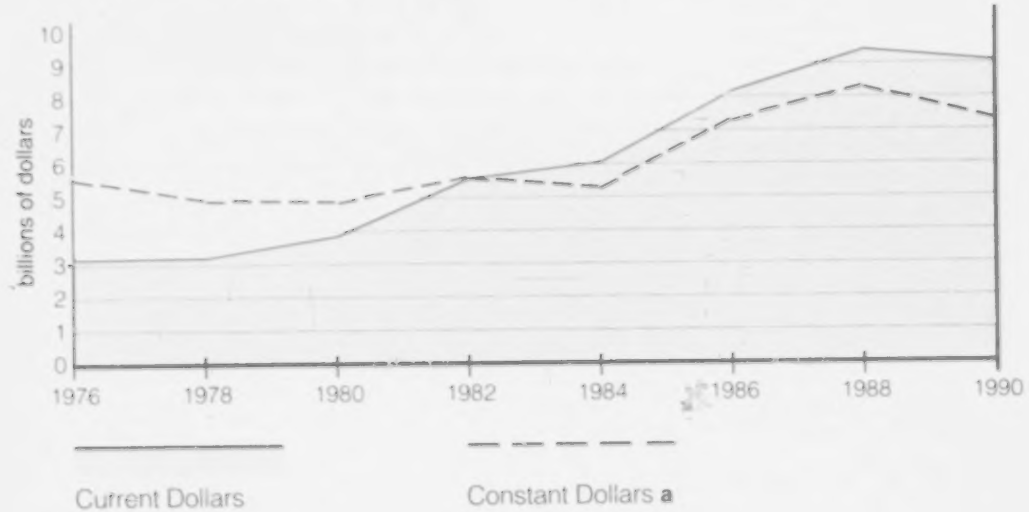
Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Revised by AIA from previously published data to include Navy Weapons Procurement in Total Missile Procurement. Beginning 1978, DOD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

Department of Defense Outlays for Missile Procurement



Sales of Missile Systems and Parts

Calendar Years 1978-1990



a Based on AIA's aerospace composite price deflator (1982=100).
E Estimate. Latest year reflects Administration's budget proposal.

ORDERS, SALES, AND BACKLOG
MISSILE SYSTEMS AND PARTS[a]

Calendar Years 1974 - 1990
(Millions of Dollars)

Year	SALES-Current Dollars	SALES-Constant Dollars[c]
1974	$ 3,454	$ 7,318
1975	3,548	6,694
1976	3,237	5,581
1977	3,118	5,021
1978	3,264[b]	4,991
1979	3,706	5,126
1980	3,971	4,945
1981	4,662	5,157
1982	5,676	5,676
1983	5,991	5,711
1984	6,094	5,364
1985	7,975	7,152
1986	8,236	7,354
1987	9,671	8,674
1988	9,485	8,364
1989	9,283	7,762[r]
1990	9,102	7,317

Year	NET NEW ORDERS	BACKLOG AS OF DECEMBER 31
1974	$ 4,059	$ 4,473
1975	3,655	4,580
1976	3,036	4,379
1977	3,280	4,541
1978	2,948	4,581
1979	3,724	4,916
1980	4,961	5,558
1981	6,030	6,749
1982	6,034	7,107
1983	7,231	8,406
1984	7,731	10,043
1985	8,122	10,190
1986	11,023	12,754
1987	11,482	14,302
1988	9,437	14,255
1989[r]	8,998	14,005
1990	7,920	12,823

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).
a Prior to 1980, includes space vehicle systems and parts sold to other than U.S. Government customers.
b AIA estimate based on MQ37D.
c Based on revised aerospace composite price deflator (1982 = 100).
r Revised.

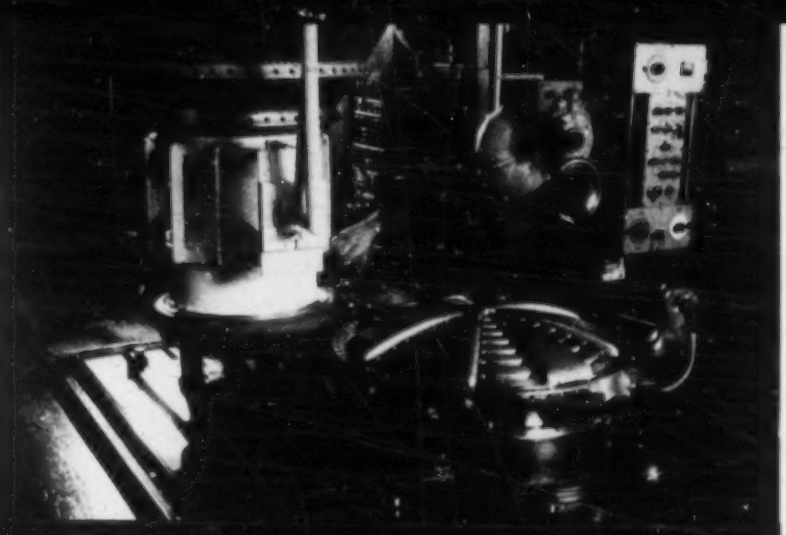
ORDERS, SALES, AND BACKLOG ENGINES AND PROPULSION UNITS FOR MISSILES AND SPACE VEHICLES[a]

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[c]		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1976	$ 641	$ 621	$ 20	$1,105	$1,071	$ 34
1977	787	757	30	1,267	1,219	48
1978	792	760	32	1,211	1,162	49
1979	952	915	37	1,317	1,266	51
1980	939	661	278	1,169	823	346
1981	1,204	786	418	1,332	869	462
1982	1,555	899	656	1,555	899	656
1983	1,814	951	863	1,729	907	823
1984	2,305	1,116	1,189	2,029	982	1,047
1985	2,466	1,256	1,210	2,212	1,126	1,085
1986	2,995	1,796	1,199	2,674	1,604	1,071
1987	2,993	1,563	1,430	2,684	1,402	1,283
1988	3,407	1,830	1,577	3,004	1,614	1,391
1989[r]	3,602	1,771	1,831	3,012	1,481	1,531
1990	3,123	1,824	1,299	2,510	1,466	1,044

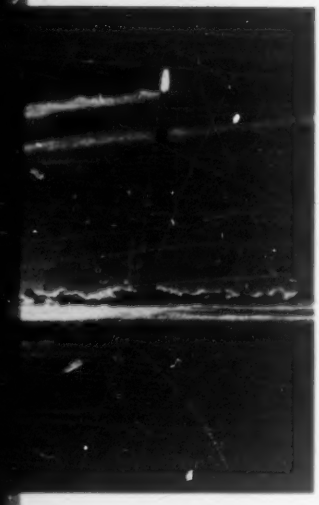
Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1976	$ 783	$ 763	$ 20	$ 673	$ 659	$ 14
1977	727	693	34	613	595	18
1978	967	919	48	788	754	34
1979	1,187	1,141	46	1,024	980	44
1980	1,221	653	568	1,284	871	413
1981	1,284	746	538	1,343	828	515
1982	2,112	1,134	978	1,901	1,063	838
1983	1,618	942	676	1,691	1,052	639
1984	3,770	2,258	1,512	3,156	2,194	962
1985	3,823	1,323	2,500	4,513	2,261	2,252
1986	1,985	1,224	761	3,503	1,689	1,814
1987	3,335	1,995	1,340	3,849	2,121	1,728
1988	3,507	1,623	1,884	3,985	1,998	1,987
1989[r]	6,113	2,475	3,638	6,410	2,595	3,815
1990	3,187	2,370	817	6,519	3,189	3,330

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).
a See table in Space Programs Chapter for Orders, Sales, and Backlog, Space Vehicle Systems.
b Prior to 1980 includes figures for non-military U.S. Government customers.
c Based on revised aerospace composite price deflator (1982 = 100).
r Revised.



91-92

Space Programs



In 1990, industry sales of space systems reached an all-time high in both current and constant dollar terms. According to data compiled by the Aerospace Industries Association, sales of civil and military space systems amounted to $28.9 billion. That figure represents a gain of more than 12 percent over the $25.8 billion recorded for the previous year. Despite the increase, space sales slipped from second to third place among industry product groupings (behind military aircraft and civil aircraft).

The Bureau of the Census reported a big drop in net new orders for space systems, which were down 17.8 percent from the 1989 all-time peak. Orders amounted to $9.6 billion in 1990, Census said; the comparable figure for 1989 was $11.7 billion.

The year-end 1990 space systems backlog (excluding propulsion) was $13.3 billion, according to Census; the previous year's figure was $13.4 billion.

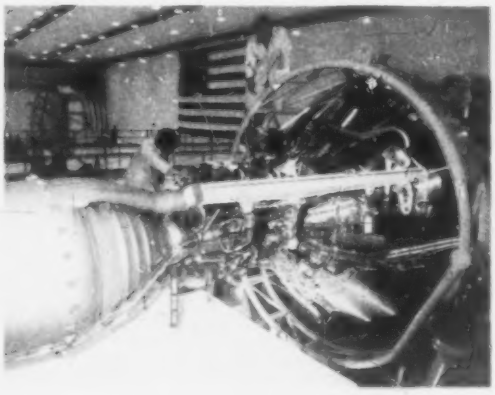
Government investment in space programs continued on the upward trend in evidence since 1973. According to the NASA Aeronautics and Space Report of the President, federal outlays for FY 1990 amounted to $28.1 billion. The estimate for FY 1991 (based on Administration budget proposals) was $29.8 billion.

The Department of Defense (DoD) remained the principal space-engaged agency in terms of outlays, with $15.4 billion in FY 1990. NASA was second with $12.3 billion in space outlays, followed by the Department of Commerce (DoC), $232 million, and the Department of Energy (DoE), $79 million. Estimates for FY 1991 outlays were $16.3 billion for

DoD, $13.1 billion for NASA, $223 million for DoC and $106 million for DoE.

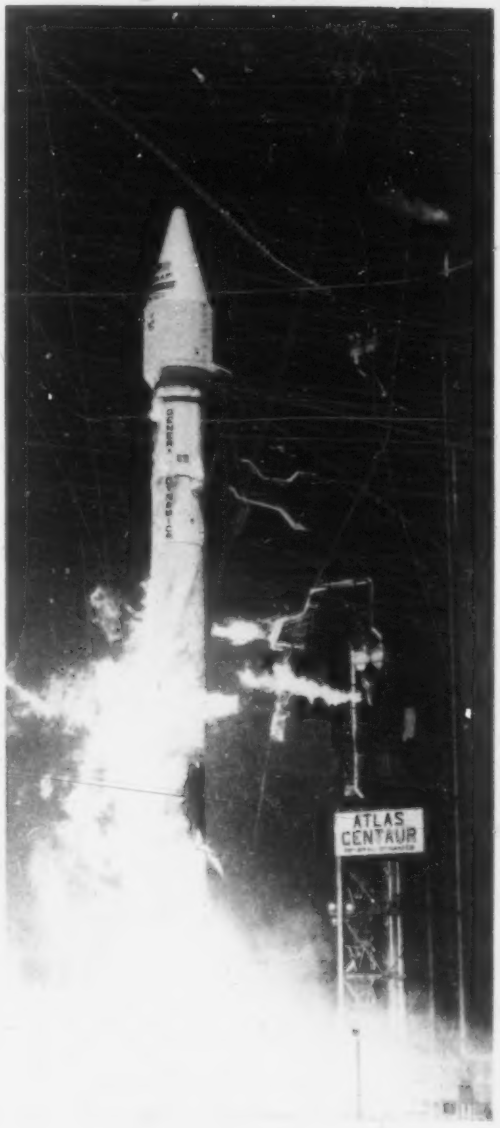
Budget authority data for DoD (USAF) and NASA provides information about the areas of greatest developmental and operational effort.

In FY 1991, the USAF's principal effort (in dollar terms) was the Strategic Defense Initiative, which was funded at $2.9 billion for Research, Development, Test and Evaluation (RDT&E). Other major RDT&E programs were the Milstar advanced communications satellite, $760 million; the Defense Support Program, $274 million; the Medium Launch Vehicle, $185 million; and space boosters, $128 million.



The USAF's primary procurement program in FY 1991 was the Defense Support Program, funded at $400 million. Other major procurements included the Medium Launch Vehicle, $270 million; the Navstar Global Positioning System, $223 million; space boosters,$207 million and Milstar, $194 million.

NASA funding is reported in four major categories. For FY 1991, Research and Development outlays amounted to $5.7 billion; Space Flight, Control and Data Communications, $5.2 billion; Research and Program Management, $2.2 billion; and Construction of Facilities, $363 million. A breakdown of the Research and Development category showed $1.9 billion for development of Space Station Freedom; $2.4 billion for Space Science and Applications; $603 million for space transport capability development; and $86 million for commercial use of space.



U.S. SPACECRAFT RECORD[a]

Calendar Years 1957 - 1990

Year	Earth Orbit[b]		Earth Escape[b]		Year	Earth Orbit[b]		Earth Escape[b]	
	Success	Failure	Success	Failure		Success	Failure	Success	Failure
1957	—	1	—	—	1975	30	4	4	—
1958	5	8	—	4	1976	33	—	1	—
1959	9	9	1	2	1977	27	2	2	—
1960	16	12	1	2	1978	34	2	7	—
1961	35	12	—	2	1979	18	—	—	—
1962	55	12	4	1	1980	16	4	—	—
1963	62	11	—	—	1981	20	1	—	—
1964	69	8	4	—	1982	21	—	—	—
1965	93	7	4	1	1983	31	—	—	—
1966	94	12	7	1[c]	1984	35	3	—	—
1967	78	4	10	—	1985	37	1	—	—
1968	61	15	3	—	1986	11	4	—	—
1969	58	1	8	1	1987	9	1	—	—
1970	36	1	3	—	1988	16	1	—	—
1971	45	2	8	1	1989	24[r]	—	2	—
1972	33	2	8	—	1990	36	—	1	—
1973	23	2	3	—					
1974	27	2	1	—	TOTAL	1,187	144	82	15

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and TRW Space & Defense Sector, "Space Log" (Annually).

a Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched on U.S. launch vehicles.

b The criterion of success is attainment of Earth orbit or Earth escape rather than judgement of mission success. "Escape" flights include all that were intended to go at least an altitude equal to the lunar distance from the Earth.

c This Earth-escape failure did attain Earth orbit and therefore is included in the Earth-orbit success totals.

r Revised.

WORLDWIDE SPACE LAUNCHINGS[a] WHICH ATTAINED EARTH ORBIT OR BEYOND

Calendar Years 1957 - 1990

Country	Total 1957-1990	1986	1987	1988	1989	1990
TOTAL	3,308	103	110	116	100[r]	116
U.S.S.R.	2,256	91	95	90	74	75
United States	923	6	8	12	17[r]	27
Japan	41	2	3	2	2	3
People's Republic of China	28	2	2	4	—	5
European Space Agency	35	2	2	7	7	5
Israel	2	—	—	1	—	1
Other[b]	23	—	—	—	—	—

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and TRW Space & Defense Sector, "Space Log" (Annually).

a Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

b Includes 10 by France, 8 by Italy (5 were U.S. spacecraft), 3 by India, 1 by Australia, and 1 by the United Kingdom.

r Revised.

U.S. SPACE LAUNCH VEHICLES

As of 1990

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Geo-synch.-Transfer Orbit	Circular Sun-Synch. Orbit
Scout (1960; 1979)	1. Algol IIIA* 2. Castor IIA* 3. Antares IIIA* 4. Altair IIIA*	431.1 285.2 83.1 25.6	255 205[b]	—	155[b]
Delta 3900 Series (Thor-Delta)[d] (1960; 1982)	1. Thor plus 9 TX 526-2* 2. Delta	912.0 375.0[c] 44.2	3,045 2,180[b]	1,275	2,135[b]
Delta II (1989)	1. Thor plus 9 TX 526-2* 2. Delta	920.8 432.0[c] 43.0	—	1,819	—
Atlas E (1959; 1972)	1. Atlas booster & sustainer	1,722.0	2,090[b,e]	—	1,500[b]
Atlas-Centaur (1972; 1984)	1 Atlas booster & sustainer 2. Centaur	1,913.0 146.0	6,100	2,360	—
Titan IV (1989)	1. Two 7-segment, 3.05-m. dia* 2. LR-87 3. LR-91 4. IUS 1st stage* 5. IUS 2nd stage*	12,402.0 2,452.0 472.0 185.0 76.0	17,690	2,404	—

Vehicle and Launch Date	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	24-Hour Polar Orbit	Sun-Synch. Transfer Orbit
Titan II (1962; 1988)	1. LR-87[2] 2. LR-91	2,108.4 444.8	2,200 1,905 [b]	—	—

(Continued on next page)

U.S. SPACE LAUNCH VEHICLES

As of 1990 (Continued)

Vehicle and Launch Date	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	24-Hour Polar Orbit	Sun-Synch. Transfer Orbit
Titan IIIB-Agena (1966)	1. LR-87	2,341.0	3,600[b]	—	3,060[b]
	2. LR-91	455.1			
	3. Agena	71.2			
Titan III(34)D/ IUS (1982)	1. Two 5 1/2-segment, 3.05-m. dia*	11,564.8	14,920	1,850[b]	—
	2. LR-87	2,366.3			
	3. LR-91	449.3			
	4. IUS 1st stage*	275.8			
	5. IUS 2nd stage*	115.7			
Titan III(34)D/ Transtage (1984)	1. Two 5 1/2-segment, 3.05-m. dia*	11,564.8	14,920	1,855[b]	—
	2. LR-87	2,366.3			
	3. LR-91	449.3			
	4. Transtage	69.8			
Space Shuttle (reusable) (1981)	1. Orbiter; 3 main engines (SSMEs) fire in parallel with SRBs	1,670[c]	24,900[f]	—	—
	2. Two solid-fueled rocket boosters (SRBs) mounted on external tank (ET) fire in parallel with SSMEs	11,790[c]			

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.
* Solid propellant; all others are liquid.
a Due east launch except as indicated.
b Polar launch.
c Each.
d Maximum performance based on 3920 and 3920 PAM (payload assist module) configurations.
e With dual TE 364-4.
f In full performance configuration (280 - 420 km orbit).

ORDERS, SALES, AND BACKLOG
SPACE VEHICLE SYSTEMS

(Excluding Engines and Propulsion Units)[a]
Calendar Years 1976 - 1990
(Millions of Dollars)

Year	SALES—Current Dollars			SALES—Constant Dollars[c]		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1976	$ 2,002	$ 904	$1,098	$ 3,452	$1,559	$1,893
1977	1,870	814	1,056	3,011	1,311	1,700
1978	2,324	1,006	1,318	3,554	1,538	2,015
1979	2,539	1,105	1,434	3,512	1,528	1,983
1980	3,483	1,461	2,022	4,337	1,819	2,518
1981	3,856	1,736	2,120	4,265	1,920	2,345
1982	4,749	2,606	2,143	4,749	2,606	2,143
1983	4,940	2,420	2,520	4,709	2,307	2,402
1984	5,225	3,019	2,206	4,599	2,658	1,942
1985	6,300	4,241	2,059	5,650	3,804	1,847
1986	6,304	4,579	1,725	5,629	4,088	1,540
1987	8,051	5,248	2,803	7,221	4,707	2,514
1988	8,622	6,190	2,432	7,603	5,459	2,145
1989[r]	9,758	6,457	3,301	8,159	5,399	2,760
1990	9,663	6,288	3,375	7,768	5,257	2,713

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1976	$ 1,932	$ 787	$1,145	$ 1,234	$ 902	$ 332
1977	2,225	1,175	1,050	1,589	1,263	326
1978	3,157	1,436	1,721[d]	2,188	1,693	495
1979	2,698	1,018	1,680	1,448	909	539
1980	3,636	1,625	2,011	2,099	1,218	881
1981	5,062	2,878	2,184	3,163	2,166	997
1982	5,842	2,718	3,124	4,254	2,277	1,977
1983	5,399	3,016	2,383	4,865	2,733	2,132
1984	4,984	3,385	1,599	4,624	3,099	1,525
1985	8,383	6,083	2,300	6,707	4,941	1,766
1986	7,437	5,666	1,771	8,063	6,028	2,035
1987	11,455	9,000	2,455	12,393	9,460	2,933
1988	7,296	4,561	2,735	10,838	7,880	2,958
1989[r]	11,709	8,107	3,602	13,356	9,192	4,164
1990	9,628	6,288	3,340	13,258	8,719	4,539

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).

a See table in Missile Program Chapter for Orders, Sales, and Backlog, Engine and Propulsion Units for Missiles and Space Vehicles.

b Space vehicle systems and parts sold to other than U.S. Government customers included as of 1980; previously, this product group combined with missile systems and parts.

c Based on revised aerospace composite price deflator.

d AIA estimate based on MQ37D data.

r Revised.

FEDERAL SPACE ACTIVITIES OUTLAYS

Fiscal Years 1961 - 1991
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD	Energy	Commerce	Other[b]
1961	$ 1,468	$ 694	$ 710	$ 64	$ -	$ -
1962	2,387	1,226	1,029	130	1	1
1963	4,079	2,517	1,368	181	12	1
1964	5,930	4,131	1,564	220	12	3
1965	6,886	5,035	1,592	232	24	3
1966	7,719	5,858	1,637	188	28	7
1967	7,237	5,337	1,673	184	39	5
1968	6,667	4,595	1,890	147	29	6
1969	6,326	4,078	2,095	118	31	5
1970	5,453	3,565	1,756	103	24	5
1971	4,999	3,171	1,693	97	30	8
1972	4,772	3,195	1,470	60	37	10
1973	4,719	3,069	1,557	51	29	13
1974	4,854	2,960	1,777	39	64	14
1975	4,891	2,951	1,831	34	64	11
1976	5,314	3,336	1,864	26	71	16
Tr.Qtr.	1,361	869	458	8	23	4
1977	5,559	3,600	1,833	22	87	18
1978	6,188	3,582	2,457	29	101	20
1979	6,808	3,744	2,892	55	97	21
1980	7,668	4,340	3,162	49	89	28
1981	9,166	4,877	4,131	47	81	30
1982	10,466	5,463	4,772	60	142	30
1983	12,590	6,101	6,247	40	178	25
1984	14,726	6,461	8,000	33	209	22
1985	17,255	6,607	10,441	34	155	17
1986	18,581	6,756	11,449	35	317	25
1987	21,844	7,254	14,264	37	262	26
1988	23,414	8,451	14,397	199	334	33
1989[r]	25,143	10,195	14,504	97	306	41
1990	28,100	12,292	15,448	79	232	49
1991[E]	29,828	13,129	16,314	106	223	56

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Excludes amounts for air transportation.
b Departments of Interior and Agriculture, and the National Science Foundation. NSF funding transferred to NASA after 1982.
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

FEDERAL SPACE ACTIVITIES OUTLAYS IN CONSTANT DOLLARS[a]

Fiscal Years 1961 - 1991
(Millions of Constant Dollars, 1982 = 100)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1961	$ 4,669	$ 2,206	$ 2,258	$205	$ —	$ —
1962	7,458	3,831	3,215	406	3	3
1963	12,519	7,725	4,197	556	37	3
1964	17,942	12,500	4,731	666	37	8
1965	20,403	14,919	4,716	688	71	9
1966	22,218	16,862	4,713	542	81	20
1967	20,143	14,853	4,657	511	107	15
1968	17,926	12,356	5,083	394	78	15
1969	16,138	10,403	5,344	300	79	12
1970	13,147	8,595	4,234	247	58	13
1971	11,450	7,263	3,878	223	68	18
1972	10,360	6,936	3,192	129	81	22
1973	9,761	6,348	3,220	106	61	26
1974	9,306	5,676	3,407	74	123	26
1975	8,503	5,130	3,183	60	111	19
1976	8,560	5,374	3,003	41	115	26
Tr.Qtr.	2,108	1,346	710	12	36	6
1977	8,294	5,370	2,734	33	130	27
1978	8,628	4,995	3,426	40	140	27
1979	8,740	4,906	3,712	70	125	26
1980	9,049	5,122	3,732	58	105	33
1981	9,833	5,232	4,431	50	87	32
1982	10,466	5,463	4,772	60	142	30
1983	12,079	5,853	5,993	38	171	24
1984	13,611	5,972	7,395	31	193	21
1985	15,471	5,924	9,362	31	139	15
1986	16,227	5,900	9,998	30	277	22
1987	18,507	6,146	12,085	32	222	22
1988	19,250[r]	6,948	11,837[r]	164	275	27
1989[r]	19,838	8,044	11,444	77	241	32
1990	21,317	9,325	11,719	60	176	37
1991[E]	21,668	9,537	11,851	77	162	41

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Based on fiscal year GNP implicit price deflator.
b Excludes amounts for air transportation.
c Departments of Interior and Agriculture, and the National Science Foundation. NSF funding transferred to NASA after 1982.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.
Tr.Qtr. See Glossary.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1961 - 1991
(Millions of Current Dollars)

Year	TOTAL	NASA[a]	DOD	Energy	Commerce	Other[b]
1961	$ 1,808	$ 926	$ 814	$ 68	$ —	$ 1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,970	5,065	1,689	187	27	3
1967	6,710	4,830	1,664	184	29	3
1968	6,529	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,341	3,547	1,678	103	8	4
1971	4,741	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	10
1973	4,825	3,093	1,623	54	40	15
1974	4,640	2,759	1,766	42	60	14
1975	4,914	2,915	1,892	30	64	13
1976	5,320	3,225	1,983	23	72	16
Tr.Qtr.	1,341	849	460	5	22	4
1977	5,983	3,440	2,412	22	91	18
1978	6,518	3,623	2,738	34	103	20
1979	7,244	4,030	3,036	59	98	21
1980	8,689	4,680	3,848	40	93	28
1981	9,978	4,992	4,828	41	87	30
1982	12,441	5,528	6,679	61	145	29
1983	15,589	6,328	9,019	39	178	25
1984	17,136	6,648	10,195	34	236	22
1985	20,167	6,925	12,768	34	423	17
1986	21,659	7,165	14,126	35	309	25
1987	26,448	9,809	16,287	48	278	27
1988	26,607	8,302	17,679	241	352	33
1989[r]	28,443	10,098	17,906	97	301	42
1990	31,854	12,142	19,382	79	202	50
1991[E]	34,419	13,603	20,443	106	211	56

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Excludes amounts for air transportation.
b Departments of Interior and Agriculture, and the National Science Foundation. NSF funding transferred to NASA after 1982.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.
Tr.Qtr. See Glossary.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY IN CONSTANT DOLLARS[a]

Fiscal Years 1961 - 1991
(Millions of Constant Dollars, 1982 = 100)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1961	$ 5,751	$ 2,945	$ 2,589	$216	$ —	$ 3
1962	10,297	5,616	4,056	463	159	3
1963	16,682	11,130	4,758	657	132	6
1964	20,669	15,177	4,838	635	9	9
1965	20,610	15,224	4,664	679	36	9
1966	20,063	14,580	4,862	538	78	9
1967	18,675	13,443	4,631	512	81	8
1968	17,556	11,912	5,168	390	75	11
1969	15,245	9,750	5,135	301	51	8
1970	12,876	8,551	4,045	248	19	10
1971	10,859	7,103	3,463	218	62	11
1972	9,933	6,667	3,055	119	67	22
1973	9,979	6,397	3,357	112	83	31
1974	8,896	5,289	3,386	81	115	27
1975	8,543	5,068	3,289	52	111	23
1976	8,570	5,195	3,194	37	116	26
Tr.Qtr.	2,077	1,315	713	8	34	6
1977	8,926	5,132	3,598	33	136	27
1978	9,088	5,052	3,818	47	144	28
1979	9,299	5,173	3,897	76	126	27
1980	10,254	5,523	4,541	47	110	33
1981	10,704	5,355	5,179	44	93	32
1982	12,441	5,528	6,679	61	145	29
1983	14,956	6,071	8,653	37	171	24
1984	15,839	6,145	9,423	31	218	20
1985	18,082	6,209	11,448	30	379	15
1986	18,915	6,257	12,336	31	270	22
1987	22,408	8,311	13,799	41	236	23
1988	21,875[r]	6,826	14,535[r]	198	289	27
1989[r]	22,442	7,967	14,128	77	237	33
1990	24,165	9,211	14,703	60	153	38
1991[E]	25,003	9,882	14,850	77	153	41

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President" (Annually).
a Based on fiscal year GNP implicit price deflator.
b Excludes amounts for air transportation.
c Departments of Interior and Agriculture, and the National Science Foundation. NSF funding transferred to NASA after 1982.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.
Tr.Qtr. See Glossary.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY

Fiscal Years 1963 - 1993
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Space Flight Control and Data Communications[a]	Construction of Facilities	Research & Program Management
1963	$ 3,673	$2,929	$ —	$744	$ (b)
1964	5,099	3,890	—	713	496
1965	5,250	4,360	—	267	623
1966	5,175	4,502	—	61	602
1967	4,968	4,235	—	85	648
1968	4,589	3,912	—	38	639
1969	3,995	3,314	—	33	648
1970	3,749	2,993	—	53	703
1971	3,312	2,556	—	26	730
1972	3,308	2,523	—	53	732
1973	3,408	2,599	—	79	730
1974	3,040	2,194	—	101	745
1975	3,231	2,323	—	143	765
1976	3,552	2,678	—	82	792
Tr.Qtr.	932	700	—	11	221
1977	3,819	2,856	—	118	845
1978	4,064	3,012	—	162	890
1979	4,559	3,477	—	148	934
1980	5,243	4,088	—	159	996
1981	5,522	4,334	—	117	1,071
1982	6,020	4,772	—	114	1,134
1983	6,875	5,539	—	139	1,197
1984	7,316	2,064[a]	3,772	223	1,256
1985	7,573	2,468	3,594	178	1,332
1986	7,807	2,619	3,670	176	1,342
1987	10,923	3,154	6,100	217	1,453
1988	9,062	3,280	3,806	213	1,763
1989	10,969	4,213	4,555	275	1,927
1990	12,324	5,225	4,645	218	2,023
1991[E]	13,977	6,024	5,232	363	2,212
1992[E]	15,723	7,199	5,576	445	2,452
1993[E]	17,176	8,513	5,684	466	2,493

Source: Office of Management and Budget, "Budget of the United States Government" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Separate budget category beginning in FY 84; funds formerly included under Research and Development.
b Included in Research and Development for one year.
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY IN CONSTANT DOLLARS[a]

Fiscal Years 1963 - 1993
(Millions of Constant Dollars, 1982 = 100)

Year	TOTAL	Research and Development	Space Flight Control and Data Communications[b]	Construction of Facilities	Research & Program Management
1963	$11,274	$ 8,990	$ —	$2,284	$ (c)
1964	15,428	11,770	—	2,157	1,501
1965	15,556	12,919	—	791	1,846
1966	14,896	12,959	—	176	1,733
1967	13,827	11,787	—	237	1,804
1968	12,339	10,519	—	102	1,718
1969	10,191	8,454	—	84	1,653
1970	9,038	7,216	—	128	1,695
1971	7,586	5,854	—	60	1,672
1972	7,182	5,478	—	115	1,589
1973	7,049	5,375	—	163	1,510
1974	5,828	4,206	—	194	1,428
1975	5,617	4,039	—	249	1,330
1976	5,722	4,314	—	132	1,276
Tr Qtr	1,444	1,084	—	17	342
1977	5,697	4,261	—	176	1,261
1978	5,666	4,200	—	226	1,241
1979	5,852	4,463	—	190	1,199
1980	6,187	4,824	—	188	1,175
1981	5,924	4,650	—	126	1,149
1982	6,020	4,772	—	114	1,134
1983	6,596	5,314	—	133	1,148
1984	6,762	1,908[b]	3,486	206	1,161
1985	6,790	2,213	3,222	160	1,194
1986	6,818	2,287	3,205	154	1,172
1987	9,254	2,672	5,168	184	1,231
1988	7,450[r]	2,697	3,129	175	1,449[r]
1989	8,655	3,324	3,594	217	1,520
1990	9,349	3,963	3,523	165	1,535
1991[E]	10,153	4,376	3,801	264	1,607
1992[E]	10,973	5,024	3,891	311	1,711
1993[E]	11,560	5,730	3,826	314	1,678

Source: AIA, derived from "Budget of the United States Government" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Based on fiscal year GNP implicit price deflator.
b Separate budget category beginning in FY 84; funds formerly included under Research and Development.
c Included in Research and Development for one year.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.
Tr Qtr See Glossary.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS

Fiscal Years 1963 - 1993
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Space Flight Control and Data Communications[a]	Construction of Facilities	Research & Program Management
1963	$ 2,552	$1,912	$ —	$225	$ 416
1964	4,171	3,317	—	438	416
1965	5,093	3,984	—	531	578
1966	5,933	4,741	—	573	619
1967	5,426	4,487	—	289	650
1968	4,724	3,946	—	126	652
1969	4,251	3,530	—	65	656
1970	3,753	2,992	—	54	707
1971	3,382	2,630	—	44	708
1972	3,422	2,623	—	50	749
1973	3,315	2,541	—	45	729
1974	3,256	2,421	—	75	760
1975	3,266	2,420	—	85	761
1976	3,669	2,749	—	121	799
Tr.Qtr.	952	731	—	26	195
1977	3,945	2,980	—	105	860
1978	3,983	2,989	—	124	870
1979	4,196	3,139	—	133	925
1980	4,852	3,702	—	140	1,010
1981	5,426	4,228	—	147	1,050
1982	6,035	4,796	—	109	1,130
1983	6,664	5,316	—	108	1,240
1984	7,048	2,792[a]	2,915	109	1,232
1985	7,251	2,118	3,707	170	1,322
1986	7,403	2,615	3,267	189	1,332
1987	7,591	2,436	3,597	149	1,409
1988	9,092	2,916	4,362	166	1,648
1989	11,051	3,922	5,030	190	1,908
1990	12,429	5,094	5,117	218	1,991
1991[E]	13,499	5,718	5,184	363	2,223
1992[E]	14,721	6,389	5,454	445	2,417
1993[E]	15,813	7,394	5,421	466	2,515

Source: Office of Management and Budget, "Budget of the United States Government" (Annually)
NOTE: Detail may not add to totals because of rounding.
a Separate budget category beginning in FYs budget proposal.
Tr.Qtr. See Glossary.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS IN CONSTANT DOLLARS[a]

Fiscal Years 1963 - 1993
(Millions of Constant Dollars, 1982 = 100)

Year	TOTAL	Research and Development	Space Flight Control and Data Communications[b]	Construction of Facilities	Research & Program Management
1963	$ 7,833	$ 5,869	$ —	$ 691	$1,277
1964	12,620	10,036	—	1,325	1,259
1965	15,090	11,804	—	1,573	1,713
1966	17,078	13,647	—	1,649	1,782
1967	15,102	12,488	—	804	1,809
1968	12,702	10,610	—	339	1,753
1969	10,844	9,005	—	166	1,673
1970	9,048	7,213	—	130	1,704
1971	7,746	6,024	—	101	1,622
1972	7,429	5,695	—	109	1,626
1973	6,856	5,255	—	93	1,508
1974	6,242	4,641	—	144	1,457
1975	5,678	4,207	—	148	1,323
1976	5,910	4,428	—	195	1,287
Tr.Qtr.	1,474	1,132	—	40	302
1977	5,885	4,446	—	157	1,283
1978	5,554	4,168	—	173	1,213
1979	5,386	4,030	—	171	1,187
1980	5,726	4,369	—	165	1,192
1981	5,821	4,536	—	158	1,126
1982	6,035	4,796	—	109	1,130
1983	6,394	5,100	—	104	1,190
1984	6,514	2,581[b]	2,694	101	1,139
1985	6,501	1,899	3,324	152	1,185
1986	6,465	2,284	2,853	165	1,163
1987	6,431	2,064	3,048	126	1,194
1988[r]	7,475	2,397	3,586	136	1,355
1989	8,719	3,095	3,969	150	1,505
1990	9,429	3,864	3,882	165	1,510
1991[E]	9,806	4,154	3,766	264	1,615
1992[E]	10,274	4,459	3,806	311	1,687
1993[E]	10,643	4,976	3,649	314	1,693

Source: AIA, derived from "Budget of the United States Government" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Based on fiscal year GNP implicit price deflator.
b Separate budget category beginning in FY 84; funds formerly included under Research and Development.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.
Tr.Qtr. See Glossary.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY FOR RESEARCH AND DEVELOPMENT AND SPACE FLIGHT, CONTROL, & DATA COMMUNICATIONS

Fiscal Years 1991 - 1992
(Millions of Dollars)

	1991[E]	1992[E]
RESEARCH AND DEVELOPMENT—TOTAL	$6,024	$7,199
Space Station—Total	$1,900	$2,029
Space Transport Capability Development—Total	603	880
Space Science & Applications—Total	2,430	2,935
Physics and Astronomy	975	1,141
Planetary Exploration	457	627
Life Sciences	138	184
Space Applications	859	983
Commercial Use of Space—Total	86	150
Aeronautics & Space Technology—Total	897	1,085
Aeronautical Research & Technology	512	591
Space Research & Technology	290	422
Transatmospheric Research & Technology	95	72
Safety, Reliability, & Quality Assurance—Total	33	34
Academic Programs—Total	55	65
Tracking & Data Advanced Systems—Total	20	22
SPACE FLIGHT, CONTROL, AND DATA COMMUNICATIONS—TOTAL	$5,124	$5,608
Space Shuttle Production & Capability Development—Total	$1,276	$1,289
Orbiter	276	274
Launch & Mission Support	253	270
Propulsion Systems	748	623
Assured Shuttle Availability	—	122
Space Shuttle Operations—Total	2,790	3,024
Flight Operations	802	913
Flight Hardware	1,393	1,417
Launch & Landing Operations	595	694
Expendable Launch Vehicles	229	342
Space and Ground Networks, Communications, & Data Systems—Total	829	954

Source: "NASA Budget Briefing Background Material" (Annually).
Note: Detail may not add to totals because of rounding.
E Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE SPACE PROGRAMS[a] PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E

Fiscal Years 1990, 1991, and 1992
(Millions of Dollars)

Agency and Program	1990		1991[E]		1992[E]	
	Procurement	RDT&E	Procurement	RDT&E	Procurement	RDT&E
AIR FORCE						
Advanced Launch System	$ —	$ 81.4	$ —	$ 25.0	$ —	$ 147.7
DMSP	136.6	47.6	167.5	48.5	133.0	28.5
DSCS	48.2	29.1	63.9	16.1	55.7	14.4
Defense Support Program	410.5	89.7	400.4	273.7	251.4	19.4
Medium Launch Vehicle	167.1	404.6	269.7	184.8	222.0	45.6
Milstar	76.9	769.6[E]	193.5	760.0	327.5	1,064.5
Navstar GPS	48.0[E]	65.5	222.7	59.6	330.4	66.4
Space Boosters	230.3	—	207.0	128.3	295.6	143.9
Space Shuttle Operations	28.2	54.6	15.1	19.1	15.1	19.1
NAVY						
FSC	$ 161.7	$ —	$ 249.6	$ —	$ 283.1	$ —
JOINT PROGRAMS						
SDI	$ —	$3,571	$ —	$2,863	$ —	$ 4,573
National Aerospace Plane	—	191	—	162	—	232

Source: Department of Defense, "Program Acquisition Costs by Weapon System" (Annually).
a Total Obligational Authority.
E Estimate. Latest year reflects Administration's budget proposal.
KEY: DMSP = Defense Meteorological Satellite Program
DSCS = Defense Satellite Communications System
FSC = Fleet Satellite Communications
GPS = Global Positioning System
SDI = Strategic Defense Initiative

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
PROGRAM FUNDING BY ELEMENT

Fiscal Years 1991, 1992, and 1993
(Millions of Dollars)

Summary	1991[E]	1992[E]	1993[E]
SDIO—TOTAL	$3,119.6	$5,183.7	$5,657.0
SDI—TOTAL	2,901.4	4,580.7	4,933.2
TMDI—TOTAL	218.2	603.0	723.8
SDI PROGRAM ELEMENTS			
Phase I Defenses:[a]	$ 866.4	$1,612.2	$1,593.4
Passive Sensors	35.1	50.0	54.9
Signal Processing	45.0	67.0	70.0
Discrimination	26.9	29.9	31.1
Sensors Studies and Experiments	92.6	111.5	104.9
Space-Based Sensor	48.0	243.9	247.1
Ground-Based Radar	24.0	15.0	45.0
HEDI	83.0	244.0	241.7
Brilliant Pebbles	392.0	659.1	582.4
Command Center	28.2	44.1	52.3
System Engineering	36.5	44.7	54.9
Limited Protection Systems:[a]	$ 395.7	$ 674.4	$ 747.5
Discrimination	94.9	124.7	141.1
Sensor Studies and Experiments	62.4	72.7	73.9
Ground-Based STS	46.8	180.7	188.2
Space-Based Interceptor	35.0	17.0	—
Ground-Based EID	84.5	207.6	268.6
Command Center	9.8	42.2	42.7
Midcourse Experiment	40.0	—	—
Theater and ATBM Defenses:[a]	$ 180.0	$ 279.4	$ 340.6
Foreign Technology Support	12.0	51.2	61.3
Theater Interceptors	30.7	10.0	10.0
Ground-Based Radar	15.0	58.4	75.9
TMD Special Studies	29.8	53.0	114.5
Theater Test Bed	37.9	39.3	17.6
Follow-on Systems:[a]	$ 696.6	$ 925.1	$1,016.3
Laser Radar Technology	21.0	45.5	41.4
Interceptor Component Technologies	99.9	149.0	155.4
Interceptor Integration Technology	118.0	139.5	146.6
Hypervelocity Technology	15.1	20.0	32.0
Interceptor Studies and Analysis	43.0	18.0	19.0
Free Electron Laser Technology	29.1	27.0	30.0
Chemical Laser Technology	91.0	131.5	146.5
Neutral Particle Beam Technology	105.4	131.5	146.5
ATP/FC	80.4	105.0	116.0
New Concepts Development	25.0	30.7	34.6

(Continued on next page)

STRATEGIC DEFENSE INITIATIVE ORGANIZATION PROGRAM FUNDING BY ELEMENT (Continued)

Fiscal Years 1991, 1992, and 1993
(Millions of Dollars)

	1991[E]	1992[E]	1993[E]
SDI PROGRAM ELEMENTS (continued)			
Research and Support Activities:[a]	$735.0	$1,089.3	$1,235.2
Survivability Technology Project	53.0	99.2	100.1
Lethality and Target Hardening	22.3	47.9	46.1
Power and Power Conditioning	34.9	78.8	81.9
Materials and Structures	21.3	47.1	49.1
Innovative Science and Technology	66.3	90.7	86.3
Special Test Activities	22.7	48.0	41.2
System Test Enviroment	103.8	124.6	146.8
Test and Evaluation Resources	64.9	105.1	99.3
Operational Support Costs	223.9	275.8	401.2
TMDI PROGRAM ELEMENTS			
TMDI Demonstration and Validation	$218.2	$ 508.0	$ 257.3
Patriot	45.4	75.5	—
Extended Range Interceptor	103.0	171.0	20.0
Arrow Continuation Experiments	42.0	60.0	60.0
THAAD Interceptor	—	150.0	122.0
Interservice Integration	27.8	51.5	55.3
TMDI Full-Scale Development	—	$ 70.0	$ 292.7
Advanced Contingency Theater Sensor	—	—	34.7
Patriot	—	70.0	75.0
Extended Range Interceptor	—	—	75.0
THAAD Interceptor	—	—	108.0
TMDI Procurement	—	$ 25.0	$ 173.7
Patriot	—	25.0	100.7
Extended Range Interceptor	—	—	43.0
THAAD Interceptor	—	—	30.0

Source: Strategic Defense Initiative Organization, "1991 Report to the Congress on the Strategic Defense Initiative" (Annually).

a Detail will not add to total. Reporting limited to program elements whose annual funding exceeds $30 million during any of these periods.

E Estimate. Represents Administration's budget request.

KEY:
- ATBM = Anti-Tactical Ballistic Missile
- ATP/FC = Acquisition, Tracking, Pointing/Fire Control
- EID = Exoatmospheric Interceptor Development
- HEDI = High-Endoatmospheric Defense Initiative
- SDI = Strategic Defense Initiative
- SDIO = Strategic Defense Initiative Organization
- STS = Surveillance and Tracking System
- THAAD = Theater High Altitude Area Defense
- TMD = Theater Missile Defense
- TMDI = Theater/Tactical Missile Defense Initiative

91-92

Air Transportation

In 1990, the U.S. air carrier industry recorded an all-time high in operating revenues, yet wound up with the greatest operating loss in history as operating expenses outpaced revenue gai ..

The loss amounted to $1.9 billion, compared with an operating profit of $1.8 billion in the preceding year. Revenues in 1990 totaled $76 billion, up from $69.2 billion in 1989. Expenses, however, increased by $10.5 billion to $77.9 billion.

The 16 percent jump in operating expenses was occasioned primarily by a sharp increase in fuel prices in the months following Iraq's invasion of Kuwait on August 2, 1990. In addition, there were continuing increases in normal operating costs, such as labor. Yield-reducing, fare-pricing practices and declining load factors also contributed to the industry's poor financial performance.

As is customary, domestic operations accounted for more than three-quarters of revenue. Domestic revenues totaled $58 billion, but domestic operating expenses exceeded the revenue by more than $1 billion.

In U.S. airline international service, revenues continued to increase dramatically, as they have since the mid-eighties. International revenues for 1990 amounted to $18 billion; the operating loss was $902 million.

Despite the recession, traffic (revenue ton miles) on U.S. airlines increased by 5.3 percent, compared with 3.1 percent in 1989. In 1990, the scheduled carriers flew 58.4 billion revenue ton miles, up from 55.5 billion in 1989. Passenger traffic amounted to 45.8 billion revenue ton miles, cargo traffic

for 12.6 billion; the comparable figures for the preceding year were 43.3 billion in passenger service and 12.2 billion in cargo haulage. The total revenue load factor dropped by a full percentage point, to 54.4 percent from 1989's 55.4 percent.

In domestic service, U.S. scheduled airlines boarded more than 423 million passengers, up from 416 million in 1989, and revenue passenger miles totaled more than 340 million, up from 330 million. The domestic service load factor was 60.4 percent, down from 62.3 percent in 1989.

ceeded revenues by $2.5 billion. The result was a loss of 1.3 percent of revenue, which compared with a positive result of 4.4 percent in 1989.

According to Exxon International Company's annual survey, covering aircraft in service as of March 31, 1990, the world fleet of turbine engine aircraft in airline service grew by 1,137 units in 1989-90 (the survey excludes aircraft operated by the Soviet national airline Aeroflot and air taxi operators).

Exxon reported a total of 14,651 active aircraft (up from 13,514), including 9,426 turbojets (up from 8,587); 5,049

Growth was somewhat stronger in international traffic carried by U.S. scheduled airlines. Enplanements, at 41.8 million, topped the previous record of 37.4 million in 1989 by more than 12 percent. Revenue passenger miles amounted to 117.7 billion, compared with 102.7 billion in 1989. Passenger load factor reached a new record level of 69.1 percent.

Global airline revenues/expenses closely paralleled the U.S. airline experience. In operations by airline members of the International Civil Aviation Organization, total operating revenues came to $198 billion, but expenses ex-

turboprops (up from 4,687); and 176 turbine-powered helicopters (down from 240).

Analysis discloses that the number of U.S.-manufactured turbine aircraft in world airline service increased (to 9,340 from 1989's 8,663) but the percentage continued to decline. The percentage has dropped every year since 1986, when 66.2 percent of the airplanes in the global turbine engine fleet were of American manufacture; in 1990 it was down to 63.7 percent. Among turbojet aircraft, the figure was 82.1 percent, among turboprops only 30.1 percent.

OPERATING REVENUES AND EXPENSES OF WORLD SCHEDULED AIRLINES[a]

Calendar Years 1986 - 1990
(Millions of U.S. Dollars)

	1986	1987	1988	1989	1990[p]
OPERATING REVENUES:					
Scheduled Services:					
Passenger	$ 94,900	$111,600	$127,250	$137,200	
Freight	15,200	17,350	19,380	19,110	
Mail	1,800	1,980	2,050	2,040	
Total Scheduled Services	$111,900	$130,930	$148,680	$158,350	NA
Non-Scheduled Services	4,500	5,640	6,360	6,650	
Incidental	8,200	10,430	11,160	14,000	
Total Operating Revenues	$124,600	$147,000	$166,200	$179,000	$198,000
OPERATING EXPENSES:					
Flight Operations	$ 32,710	$ 37,390	$ 39,270	$ 44,520	
Maintenance & Overhaul	13,850	15,960	18,320	19,590	
Depreciation & Amortization	9,070	10,820	12,150	12,520	
User Charges & Station Expenses	21,340	24,410	28,440	29,080	NA
Passenger Services	12,140	14,260	15,900	17,880	
Ticketing, Sales & Promotion	21,480	24,570	27,080	30,070	
General, Administrative & Other	9,410	12,390	14,840	17,540	
Total Operating Expenses	$120,000	$139,800	$156,000	$171,200	$200,500
OPERATING RESULT	$ 4,600	$ 7,200	$ 10,200	$ 7,800	$ (2,500)
Percent of Revenue	3.7%	4.9%	6.1%	4.4%	-1.3%
NET RESULT[b]	$ 1,500	$ 2,500	$ 5,000	$ 3,700	NA
Percent of Revenue	1.2%	1.7%	3.0%	2.1%	NA

Source: International Civil Aviation Organization, "Civil Aviation Statistics of the World" (Annually).
a Excludes domestic operations in the USSR.
b Net Result equals Operating Result minus non-operating items, including interest, income taxes, retirement of property and equipment, affiliated companies, and subsidies.
NA Not available.
p Preliminary.
() Denotes loss.

TRAFFIC STATISTICS
WORLD AIRLINE SCHEDULED SERVICE[a]
Calendar Years 1970 - 1990

Year	Passengers Carried	Freight Tons Carried	Passenger-Miles Performed	Seat-Miles Available	Passenger Load Factor	Ton-Miles Performed		
						Freight	Mail	TOTAL (Passengers & Baggage, Freight, Mail)
	(Millions)		(Billions)		(Percent)	(Millions)		
1970	383	6.7	286	522	55%	8,180	2,150	38,810
1971	411	7.4	307	568	54	9,060	1,990	41,420
1972	450	8.0	348	609	57	10,290	1,900	46,690
1973	489	9.0	384	667	58	12,010	1,970	51,910
1974	515	9.5	408	688	59	13,030	1,980	55,270
1975	534	9.6	433	733	59	13,270	1,990	58,080
1976	576	10.3	475	789	60	14,750	2,080	63,880
1977	610	11.1	508	837	61	16,190	2,180	68,790
1978	679	11.7	582	902	65	17,770	2,240	77,770
1979	754	12.1	659	999	66	19,190	2,350	86,900
1980	748	12.2	677	1,071	63	20,120	2,520	89,710
1981	752	12.0	695	1,091	64	21,150	2,600	92,800
1982	766	12.8	710	1,115	64	21,600	2,650	94,830
1983	798	13.5	739	1,151	64	24,050	2,740	100,270
1984	848	14.8	794	1,226	65	27,170	2,950	109,040
1985	899	15.1	850	1,293	66	27,290	3,010	114,860
1986	960	16.2	902	1,389	65	29,580	3,110	122,470
1987	1,027	17.7	987	1,471	67	33,120	3,210	134,540
1988[r]	1,080	19.0	1,060	1,570	68	36,550	3,310	145,330
1989	1,118	20.0	1,110	1,630	68	39,220	3,460	153,290
1990[p]	1,160	20.1	1,180	1,735	68	40,440	3,620	161,560

Source: International Civil Aviation Organization (ICAO).
a Includes international and domestic traffic on scheduled service performed by the airlines of the 161 states which were members of ICAO in 1990.
p Preliminary.
r Revised.

OPERATING REVENUES AND EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1964 - 1990
(Millions of Dollars)

Year	TOTAL OPERATIONS[b]			Domestic Operations			International Operations		
	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)
1964	$ 4,251	$ 3,781	$ 470	$ 3,169	$ 2,849	$ 320	$ 1,082	$ 932	$ 150
1965	4,958	4,286	672	3,691	3,239	452	1,267	1,047	220
1966	5,745	4,970	775	4,171	3,670	502	1,574	1,300	274
1967	6,865	6,157	708	4,981	4,560	421	1,884	1,597	287
1968	7,753	7,248	505	5,691	5,397	295	2,062	1,852	210
1969	8,791	8,403	387	6,936	6,613	322	1,855	1,790	65
1970	9,290	9,247	43	7,180	7,181	(1)	2,109	2,066	44
1971	10,046	9,717	328	7,753	7,496	257	2,292	2,221	71
1972	11,163	10,578	584	8,652	8,158	493	2,512	2,420	91
1973	12,419	11,834	585	9,694	9,200	494	2,725	2,633	91
1974	14,703	13,978	725	11,546	10,761	785	3,157	3,218	(60)
1975	15,356	15,229	128	12,020	11,903	117	3,336	3,326	11
1976	17,503	16,781	721	13,899	13,324	575	3,605	3,457	147
1977	19,926	19,018	908	15,822	15,166	657	4,104	3,852	252
1978	22,892	21,527	1,366	18,189	17,172	1,018	4,703	4,355	348
1979	27,227	27,028	199	21,652	21,523	129	5,575	5,505	69
1980	33,728	33,949	(222)	26,404	26,409	(6)	6,543	6,766	(223)
1981	36,211	36,612	(401)	28,788	29,051	(264)	6,390	6,574	(184)
1982	36,066	36,804	(739)	28,728	29,478	(750)	6,435	6,452	(17)
1983	38,593	38,231	362	31,014	31,186	(171)	7,163	6,693	470
1984	44,060	41,946	2,114	35,394	33,812	1,582	7,975	7,485	490
1985	48,580	47,207	1,372	37,629	36,611	1,018	8,302	7,984	319
1986	50,086	48,855	1,231	41,001	39,984	1,060	8,621	8,458	163
1987	56,787	54,339	2,448	45,658	43,925	1,733	10,925	10,226	698
1988	63,679	60,236	3,443	50,187	47,739	2,448	13,402	12,403	998
1989	69,225	67,413	1,812	54,314	52,460	1,855	14,911	14,954	(43)
1990[p]	75,967	77,881	(1,914)	57,991	59,004	(1,012)	17,976	18,878	(902)

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).
NOTE: Detail may not add to totals because of rounding.
a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
b For 1980 and subsequent years, includes "Other" operations not reported as "Domestic" or "International."
p Preliminary.

SOURCES OF OPERATING REVENUES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger Service[b]	Mail[c]	Freight[p] & Air Express	Excess Baggage	Other[c]
DOMESTIC OPERATIONS						
1976	$13,899	$12,104	$294	$ 942	$22	$ 537
1977	15,822	13,773	355	1,109	21	564
1978	18,189	15,753	336	1,347	23	730
1979	21,652	18,931	417	1,485	28	791
1980	26,404	23,317	446	1,582	32	1,027
1981	28,788	25,504	497	1,659	36	1,091
1982	28,728	25,440	524	1,505	42	1,218
1983	31,014	27,519	516	1,602	52	1,326
1984	35,393	31,437	552	1,716	70	1,618
1985	37,629	33,343	733	1,581	78	1,895
1986	41,001	33,814	679	4,278	85	2,159
1987	45,658	37,492	704	4,952	67	2,443
1988	50,187	41,002	789	5,807	72	2,518
1989	54,314	43,670	767	5,408	70	4,399
1990[p]	57,991	46,283	747	4,284	76	6,601
INTERNATIONAL OPERATIONS						
1976	$ 3,605	$ 2,665	$112	$ 626	$27	$ 175
1977	4,104	3,047	112	710	21	215
1978	4,703	3,534	117	750	20	282
1979	5,575	4,271	131	837	23	313
1980	6,543	4,984	175	1,011	25	348
1981	6,390	4,916	165	984	25	299
1982	6,435	4,959	177	990	25	283
1983	7,163	5,605	152	999	23	384
1984	7,975	6,074	158	1,169	27	546
1985	8,302	6,451	161	1,130	28	532
1986	8,621	6,551	154	1,451	28	437
1987	10,925	8,374	180	1,783	33	555
1988	13,402	10,357[r]	183	2,150	39	672
1989	14,911	11,181	188	2,417	47	1,078
1990[p]	17,976	13,452	223	2,606	43	1,652

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).
NOTE: Detail may not add to totals because of rounding.
a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
b Scheduled and charter.
c Subsidy included with Mail through 1979, and thereafter included in Other, which also includes revenues not related to transport, plus, beginning in 1981, transport revenues not specifically broken out by category by some small carriers.
p Preliminary.
r Revised.

OPERATING EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1976 - 1990
(Millions of Dollars)

Year	TOTAL Operating Expenses	Flying Operations	Maintenance	Passenger Service	Aircraft & Traffic Servicing	Promotion and Sales	Depreciation & Amortization	Other[b]
DOMESTIC OPERATIONS								
1976	$13,324	$ 4,448	$1,816	$1,260	$2,443	$1,495	$ 927	$ 935
1977	15,166	5,288	2,001	1,461	2,728	1,713	967	1,008
1978	17,172	5,669	2,155	1,711	3,120	2,040	1,231	1,246
1979	21,523	7,998	2,457	2,091	3,702	2,564	1,373	1,337
1980	26,409	11,029	2,758	2,329	4,051	3,096	1,560	1,586
1981	29,051	12,037	2,822	2,522	4,497	3,708	1,723	1,742
1982	29,478	11,529	2,709	2,668	4,665	4,160	1,876	1,869
1983	31,186	11,370	2,878	2,983	5,104	4,764	2,107	1,980
1984	33,812	12,161	3,176	3,192	5,369	5,310	2,223	2,380
1985	36,611	12,684	3,604	3,464	5,781	6,089	2,318	2,670
1986	39,934	11,368	4,475	3,793	7,680	6,820	2,652	3,171
1987	43,925	12,509	4,951	4,169	8,575	7,399	2,855	3,468
1988	47,739	13,176	5,643	4,444	9,527	8,235	2,977	3,737
1989	52,460	14,749	6,184	4,775	9,449	8,718	3,078	5,507
1990[p]	59,004	18,183	6,924	5,221	9,097	9,106	3,267	8,206
INTERNATIONAL OPERATIONS								
1976	$ 3,457	$ 1,215	$ 399	$ 300	$ 597	$ 473	$ 205	$ 268
1977	3,852	1,303	450	351	668	526	253	301
1978	4,355	1,351	498	427	768	623	323	363
1979	5,505	1,960	571	538	922	774	352	388
1980	6,766	2,775	616	600	1,049	917	385	423
1981	6,574	2,757	540	583	932	945	382	435
1982	6,452	2,596	512	577	893	954	396	525
1983	6,693	2,490	548	664	936	1,162	389	505
1984	7,485	2,629	677	749	975	1,308	446	701
1985	7,984	2,738	768	852	1,069	1,414	482	662
1986	8,458	2,402	901	877	1,386	1,665	518	711
1987	10,226	2,836	1,096	1,059	1,749	2,094	533	860
1988	12,403	3,230	1,332	1,280	2,193	2,742	618	1,009
1989	14,954	3,919	1,724	1,454	2,483	3,108	746	1,520
1990[p]	18,878	5,426	2,050	1,737	2,656	3,831	890	2,289

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).
NOTE: Detail may not add to totals because of rounding.
a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
b General and administrative and other transport-related expenses.
p Preliminary.

U.S. AIR CARRIERS
TOTAL ASSETS AND INVESTMENT IN EQUIPMENT

Calendar Years 1969 - 1990
(Millions of Dollars)

Year	TOTAL Assets	Value of Flight Equipment	Value of Ground Property & Equipment, & Other[a]	Less: Reserves for Depreciation & Overhaul	Equals: Net Value of Owned Operating Property & Equipment	Investment in Operating Property and Equipment as a Percent of Total Assets
1969	$12,069	$ 9,943	$ 1,516	$ 3,560	$ 7,899	65.4%
1970	12,913	10,950	1,951	4,120	8,782	68.0
1971	12,998	11,221	2,028	4,649	8,600	66.2
1972	13,635	11,918	2,225	5,115	9,028	66.2
1973	14,464	12,908	2,424	5,693	9,639	66.6
1974	15,200	13,538	2,539	6,252	9,826	64.6
1975	15,064	14,035	2,635	6,823	9,847	65.4
1976	15,454	14,399	2,792	7,585	9,605	62.2
1977	16,869	14,822	2,997	8,141	9,679	57.4
1978	20,745	16,127	3,367	8,799	10,696	51.6
1979	24,907	18,561	3,985	9,746	12,800	51.4
1980	28,900	20,859	4,682	10,309	15,233	52.7
1981	30,513	22,375	5,175	11,028	16,521	54.1
1982	31,525	23,786	5,424	11,405	17,804	56.5
1983	35,213	26,588	6,191	12,910	19,868	56.4
1984	36,769	28,509	6,061	14,043	20,527	55.8
1985	40,978	30,402	6,772	15,467	21,707	53.0
1986	47,105	31,750	8,468	14,764	25,454	54.0
1987	51,436	33,177	9,223	15,580	26,820	52.1
1988[r]	56,047	35,781	10,248	17,450	28,579	51.0
1989[r]	62,454	38,812	11,903	19,018	31,697	50.8
1990[p]	67,873[r]	40,235	13,539	20,591	33,183	48.9

Source: Department of Transportation, Office of Aviation Statistics, Air Carrier Financial Statistics Quarterly (Quarterly).
a Includes land and construction in progress.
p Preliminary.
r Revised.

TRAFFIC STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE[a]
Calendar Years 1964 - 1990

Year	Revenue Ton-Miles (Millions)			Total Available Ton Miles (Millions)	Total Revenue Load Factor	Average Aircraft Revenue Miles (Millions)	Overall Flight Stage Length (Miles)	Average Available Seats per Aircraft Mile
	Passenger	Cargo[b]	Total					
1964	5,630	1,803	7,434	15,514	47.9%	1,189	301	93
1965	6,629	2,356	8,986	18,408	48.8	1,354	322	96
1966	7,736	2,949	10,686	20,939	51.0	1,482	339	98
1967	9,561	3,475	13,036	26,968	48.3	1,834	371	101
1968	11,023	4,226	15,249	33,221	45.9	2,146	401	107
1969	12,197	4,701	16,898	38,664	43.7	2,385	443	112
1970	13,171	4,994	18,166	41,693	43.6	2,426	473	117
1971	13,565	5,120	18,685	44,139	42.3	2,378	476	125
1972	15,241	5,506	20,746	45,583	45.5	2,376	471	129
1973	16,196	6,046	22,242	49,019	45.4	2,448	477	135
1974	16,292	6,133	22,425	46,848	47.9	2,258	478	140
1975	16,281	5,905	22,186	47,254	46.9	2,241	476	143
1976	17,899	6,222	24,121	49,325	48.9	2,320	480	146
1977	19,322	6,587	25,909	52,284	49.6	2,419	490	149
1978	22,678	7,001	29,679	54,765	54.2	2,520	502	152
1979	26,202	7,189	33,390	60,844	54.9	2,791	517	154
1980	25,519	7,084	32,603	62,983	51.8	2,816	526	158
1981	24,889	7,060	31,949	61,186	52.2	2,703	519	161
1982	25,964	6,886	32,850	62,401	52.6	2,699	544	167
1983	28,183	7,573	35,756	65,385	54.7	2,809	558	169
1984	30,512	8,185	38,697	72,223	53.6	3,134	575	168
1985	33,640	7,689	41,329	76,059	54.3	3,320	569	168
1986	36,655	9,026	45,681	85,140	53.7	3,725	580	168
1987	40,453	10,016	50,469	92,209	54.7	3,988	606	167
1988	42,330	11,469[r]	53,800	97,899	55.0	4,141	618	169
1989	43,271	12,187[r]	55,458[r]	100,082[r]	55.4	4,193[r]	633	169
1990	45,792	12,604	58,395	107,340	54.4	4,491	649	170

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Traffic Statistics Monthly" (Monthly)
NOTE: Detail may not add to totals because of rounding.
a Includes international and domestic operations.
b Includes freight, air express, U.S. and foreign mail.
r Revised.

PASSENGER STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE
DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1976 - 1990

Year	Revenue Passenger Enplanements (Thousands)	Average Passenger Trip-Length (Miles)	Revenue Passenger Miles (Millions)	Available Seat Miles (Millions)	Revenue Passenger Load Factor[a]
DOMESTIC OPERATIONS					
1976	206,279	704	143,271	261,248	54.8%
1977	222,283	704	156,609	280,619	55.8
1978	253,957	719	182,669	299,542	61.0
1979	292,700	714	208,891	332,796	62.8
1980	272,829	736	200,829	346,028	58.0
1981	265,304	749	198,715	346,172	57.4
1982	274,342	766	210,149	359,528	58.5
1983	296,721	765	226,909	379,150	59.8
1984	321,047	759	243,692	422,507	57.7
1985	357,109	758	270,584	445,826	60.7
1986	393,864	767	302,090	497,991	60.7
1987	416,831	779	324,637	526,958	61.6
1988	419,210	786	329,309	536,663	61.4
1989	416,331	793[r]	329,975	530,079	62.3
1990	423,711	803	340,219	563,044	60.4
INTERNATIONAL OPERATIONS					
1976	17,039	1,979	33,717	61,574	54.8%
1977	18,043	2,029	36,610	64,947	56.4
1978	20,759	2,125	44,112	69,209	63.7
1979	24,163	2,199	53,132	83,330	63.8
1980	24,074	2,258	54,363	86,507	62.8
1981	20,672	2,427	50,173	78,725	63.7
1982	19,760	2,505	49,495	80,591	61.4
1983	21,917	2,506	54,920	85,388	64.3
1984	23,636	2,599	61,424	92,817	66.2
1985	24,913	2,642	65,819	101,963	64.6
1986	25,082	2,570	64,456	109,445	58.9
1987	30,847	2,588	79,834	121,763	65.6
1988	35,404	2,655	93,992	140,140	67.1
1989	37,361	2,750	102,739	154,297	66.6
1990	41,846	2,813	117,696	170,310	69.1

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Traffic Statistics Monthly" (Monthly).
a Revenue passenger miles as a percent of available seat miles.
r Revised.

PERCENT OF CIVIL TURBOJET ENGINE MARKET BY MANUFACTURER AND AIRCRAFT MODEL

as of December 1990

Aircraft Manufacturer and Model	Total Installed Engines	Engine Manufacturers					
		P&W	GE	RR	CFM	IAE	Other
TOTAL ENGINES	29,768	15,333	3,109	2,572	2,200	78	6,476
PERCENT SHARE	100.0%	51.5%	10.4%	8.6%	7.4%	0.3%	21.8%
Airbus A300[a]	398	23%	77%	—%	—%	—%	—%
Airbus A300B4-200	260	12	88	—	—	—	—
Airbus A310	356	35	65	—	—	—	—
Airbus A320	252	—	—	—	69	31	—
Antonov AN-124	84	—	—	—	—	—	100
AS Corvette	20	100	—	—	—	—	—
AS Caravelle	116	72	—	28	—	—	—
AS/BAe CONCORDE	56	—	—	100	—	—	—
BAe 1-11	332	—	—	100	—	—	—
BAe 146	596	—	—	—	—	—	100
BAe HS Trident	78	—	—	100	—	—	—
BAe HS 125	56	—	—	43	—	—	57
Boeing B-707[a]	196	94	—	6	—	—	—
Boeing B-707-320C	676	100	—	—	—	—	—
Boeing B-720	48	100	—	—	—	—	—
Boeing B-727 series[a]	417	100	—	—	—	—	—
Boeing B-727[b]	627	100	—	—	—	—	—
Boeing B-727C	351	100	—	—	—	—	—
Boeing B-727-200	879	100	—	—	—	—	—
Boeing B-727-200 ADV	2,712	100	—	—	—	—	—
Boeing B-737[a]	332	72	—	—	28	—	—
Boeing B-737-200	390	100	—	—	—	—	—
Boeing B-737-200 ADV	1,438	100	—	—	—	—	—
Boeing B-737-300	1,262	—	—	—	100	—	—
Boeing B-737-400	268	—	—	—	100	—	—
Boeing B-747[a]	1,304	51	29	19	—	—	—
Boeing B-747-100	660	95	—	5	—	—	—
Boeing B-747-200B	1,148	60	27	13	—	—	—
Boeing B-757[a]	68	62	—	38	—	—	—
Boeing B-757-200	586	45	—	55	—	—	—
Boeing B-767[a]	270	28	65	7	—	—	—
Boeing B-767-200	204	34	66	—	—	—	—
Boeing B-767-200ER	214	55	45	—	—	—	—
Cessna 500s	158	100	—	—	—	—	—
Cessna 650	10	—	—	—	—	—	100
Convair CV 880	8	—	100	—	—	—	—
Convair CV-990	4	—	100	—	—	—	—
Dassault Falcon	187	—	68	—	—	—	32
Dassault Mercure 100	22	100	—	—	—	—	—
Fokker F-28[a]	178	—	—	100	—	—	—
Fokker F-28-4000	220	—	—	100	—	—	—
Fokker 100	116	—	—	100	—	—	—

(Continued on next page)

PERCENT OF CIVIL TURBOJET ENGINE MARKET BY MANUFACTURER AND AIRCRAFT MODEL

as of December 1990

Aircraft Manufacturer and Model	Total Installed Engines	Engine Manufacturers					
		P&W	GE	RR	CFM	IAE	Other
Learjet 23	20	—%	100%	—%	—%	—%	—%
Learjet 24	44	—	100	—	—	—	—
Learjet 25	28	—	100	—	—	—	—
Learjet 29	2	—	100	—	—	—	—
Learjet 35	68	—	—	—	—	—	100
Learjet 36	8	—	—	—	—	—	100
Learjet 55	12	—	—	—	—	—	100
Gulfstream II	16	—	—	100	—	—	—
Gulfstream III	22	—	—	100	—	—	—
IAI 1100s	26	—	—	—	—	—	100
Ilyushin IL-62[a]	332	—	—	—	—	—	100
Ilyushin IL-62M	592	—	—	—	—	—	100
Ilyushin IL-76	940	—	—	—	—	—	100
Ilyushin IL-86	308	—	—	—	—	—	100
Lockheed JetStar	36	78	—	—	—	—	22
Lockheed L-1011[a]	357	—	—	100	—	—	—
Lockheed L-1011-1	339	—	—	100	—	—	—
MBB Hansa	10	—	100	—	—	—	—
Douglas DC-8	1,204	66	—	—	34	—	—
Douglas DC-9[a]	626	100	—	—	—	—	—
Douglas DC-9-30	1,078	100	—	—	—	—	—
Douglas DC-10[a]	300	41	59	—	—	—	—
Douglas DC-10-10	351	—	100	—	—	—	—
Douglas DC-10-30	453	—	100	—	—	—	—
MDC MD-11	9	—	100	—	—	—	—
MDC MD-82	906	100	—	—	—	—	—
MDC MD-83	250	100	—	—	—	—	—
MDC MD-80s	446	100	—	—	—	—	—
Mitsubishi Diamond	2	100	—	—	—	—	100
Rockwell Sabre	100	100	—	—	—	—	—
Tupolev TU-134[a]	164	—	—	—	—	—	100
Tupolev TU-134A	354	—	—	—	—	—	100
Tupolev TU-154[a]	513	—	—	—	—	—	100
Tupolev TU-154B	339	—	—	—	—	—	100
Tupolev TU-154B2	939	—	—	—	—	—	100
Tupolev TU-154M	375	—	—	—	—	—	100
Yakolev YAK-40 series[a]	27	—	—	—	—	—	100
Yakolev YAK-40[b]	588	—	—	—	—	—	100
Yakolev YAK-42	102	—	—	—	—	—	100

Source: Aerospace Industries Association, based on data from Aviation Data Service.
a Data for major (100 or more aircraft) series excluded and reported separately.
b Series bearing same designation as model number, but qualifies for separate reporting as a major series.
KEY AS = Aerospatiale; BAe = British Aerospace; CFM = CFM International;
GE = General Electric; IAE = International Aero Engines;
IAI = Israel Aircraft Industries; MDC = McDonnell Douglas;
MBB = Messerschmitt-Boelkow-Blohm; P&W = Pratt & Whitney; RR = Rolls-Royce.

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

(By Model, 1986 - 1990)

	1986	1987	1988	1989	1990
TOTAL AIRCRAFT IN SERVICE	10,999	11,711	12,575	13,514	14,651
Turbojets—TOTAL	7,188	7,600	8,085	8,587	9,426
Aerospatiale SE-210 Caravelle	67	60	59	56	49
Aerospatiale SN-601 Corvette	11	11	12	12	7
Airbus A300	247	267	272	294	327
Airbus A310	79	94	116	147	180
Airbus A320	—	—	2	23	130
B.Ae./Aerospatiale Concorde	14	14	14	14	14
B.Ae. 146	37	59	82	102	144
B.Ae. One-Eleven	162	166	167	164	132
B.Ae. Trident	34	34	27	27	25
B.Ae. (HS) 125	14	18	16	17	16
Boeing 707/720	284	273	245	224	210
Boeing 727	1,678	1,676	1,686	1,684	1,648
Boeing 737	1,135	1,284	1,426	1,585	1,836
Boeing 747	597	629	653	676	775
Boeing 757	89	117	167	215	324
Boeing 767	133	163	207	254	345
Canadair CL-601 Challenger	—	—	1	—	—
Cessna 500/550/650 Citation I/II/III	29	28	37	48	43
Convair 880/990	10	12	2	2	—
Dassault Falcon 10/20/50	32	30	39	44	39
Dassault Mercure	11	11	11	11	11
Fokker F-28 Fellowship	189	197	203	203	199
Fokker 100	—	—	1	14	58
Gates Learjet	30	43	56	56	37
Gulfstream II/III G-1159	13	15	14	14	15
Ilyushin IL-62	56	60	66	67	56
Ilyushin IL-76	42	44	55	58	60
Israel Aircraft 1121/1124	8	9	7	3	2
Lockheed L-1011 Tristar	217	230	229	229	228
Lockheed L-1329 Jetstar	7	12	13	13	6
MBB Hansa HFB-320	1	1	1	5	—
McDonnell Douglas DC-8	244	258	282	276	253
McDonnell Douglas DC-9	1,149	856	853	842	847
McDonnell Douglas MD-80		362	462	588	799
McDonnell Douglas DC-10	356	355	361	370	365
McDonnell Douglas MD-11	—	—	—	—	3
Mitsubishi MU-300 Diamond	—	—	1	2	—
Rockwell/Sabreliner 60	—	—	—	3	3
Tupolev Tu-134	98	98	101	97	74
Tupolev Tu-154	57	74	87	95	111
Yakolev Yak-40/42	58	42	52	53	55
Turboprops—TOTAL	3,546	3,808	4,219	4,687	5,049
Aero Spacelines SuperGuppy	—	—	4	4	—
Aerospatiale N.262/Mohawk 298	28	28	25	23	16
Aerospatiale/Aeritalia ATR 42	10	36	76	122	178
Aerospatiale/Aeritalia ATR 72	—	—	—	—	17
Airtech CN-235	—	—	2	8	18

(Continued on next page)

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

(By Model, 1986 - 1990, continued)

	1986	1987	1988	1989	1990
Turboprops (continued)					
Antonov An-12	11	14	14	15	19
Antonov An-24/26/30/32	163	200	215	251	246
B.Ae. ATP	—	—	—	12	31
B.Ae. Vanguard	7	8	9	7	5
B.Ae. Viscount	68	47	45	40	33
B.Ae. (HP-137) Jetstream 31	88	114	166	201	277
B.Ae. (HS) Argosy	7	5	5	5	—
B.Ae. HS-748	155	157	154	152	139
Beech 18 Turbo	8	15	21	24	24
Beech 90 King Air	39	36	44	40	26
Beech 99	179	169	171	173	140
Beech 100 King Air	13	21	24	22	23
Beech 200/300 Super King Air	53	62	70	83	78
Beech 1300	—	—	—	5	14
Beech 1900C	42	64	73	95	171
Bristol 175 Britannia	8	8	7	7	6
Canadair CL-44	16	15	14	15	13
CASA/Nurtanio C-212 Aviocar	105	97	103	112	104
Cessna 208 Caravan I	64	74	150	229	287
Cessna F406 Caravan II	—	—	—	14	19
Cessna 425/441 Conquest I/II	16	16	9	19	8
Convair 580/600/640	146	142	131	132	108
DHC-2 Turbo Beaver/Otter	9	3	3	3	4
DHC-5 Buffalo	2	2	2	1	1
DHC-6 Twin Otter	455	450	464	465	432
DHC-7 Dash 7	90	95	100	106	94
DHC-8 Dash 8	21	55	82	120	214
Dornier DO-228	39	59	79	90	113
Douglas DC-3T Turbo Express	1	1	1	—	—
Embraer EMB-110 Bandeirante	207	232	231	222	200
Embraer EMB-120 Brasilia	8	28	64	113	201
Fokker/Fairchild F-27/FH-227 Friendship	434	436	434	432	401
Fokker 50	—	—	13	45	101
GAF Nomad	23	23	16	14	9
Grumman G-73 Turbo Mallard	7	8	11	10	9
Grumman G-159 Gulfstream I	26	31	32	37	34
Handley Page Herald	15	21	15	17	17
Harbin Y-12 II	—	—	—	—	2
IAI Arava	—	—	3	4	3
Ilyushin IL-18	72	71	69	67	48
LET L-410	—	—	—	—	3
Lockheed L-188 Electra	76	77	79	83	74
Lockheed L-100/L-382 Hercules	60	56	52	58	56
Mitsubishi MU-2B	10	12	11	5	5
Nihon AMC YS-11	117	108	107	102	97
Pilatus PC-6 Turbo Porter	33	25	—	—	—
Pilatus Britten-Norman BN-2T Turbo Islander	5	5	3	3	2

(Continued on next page)

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

(By Model, 1986 - 1990, continued)

	1986	1987	1988	1989	1990
Turboprops (continued)					
Piper PA-31T/42 Cheyenne	21	18	28	35	29
Piper T-1040	11	8	9	15	15
Rockwell Turbo Commander	10	9	11	16	14
Saab SF-340A/B	39	67	105	136	206
Saunders ST-27	10	11	9	2	—
Shorts SC-5 Belfast	5	5	5	5	5
Shorts SC-7 Skyliner/Skyvan	29	15	14	15	16
Shorts 330	76	71	76	68	64
Shorts 360	78	106	130	142	150
Swearingen Merlin	30	52	45	46	41
Swearingen Metro	291	302	356	361	249
Transall C-160	9	8	8	8	8
Xian (Antonov) Y-7	1	10	20	31	31
Turbine-Powered Helicopters—TOTAL	265	303	271	240	176
Aerospatiale SA-315 Lama	3	3	3	—	—
Aerospatiale SA-316 Alouette III	12	11	9	8	4
Aerospatiale SA-318 Alouette II	1	4	4	4	3
Aerospatiale SA-319 Alouette III Astazou	2	4	4	4	4
Aerospatiale (Nurtanio) SA-330 Puma	18	23	23	22	16
Aerospatiale AS-332 Super Puma	5	5	5	5	5
Aerospatiale AS-335	1	—	—	—	—
Aerospatiale AS-350 Ecureuil/ AStar	5	5	6	7	10
Aerospatiale AS-355 Ecureuil 2/ Twinstar	2	2	2	3	4
Aerospatiale SA-365 Dauphin II	9	9	9	12	10
Bell (Agusta/Fuji) 204	8	6	6	5	6
Bell 205	6	2	2	2	2
Bell 206 Jetranger/Longranger	52	53	52	39	26
Bell 212	27	27	29	27	15
Bell (Fuji) 214/214ST	6	5	1	—	—
Bell 222 UT	5	5	4	1	—
Bell 412	5	5	5	2	3
Boeing-Vertol 234 Chinook	4	3	3	—	—
Hughes (Kawasaki) 500/369D	13	10	1	1	1
MBB/Kawasaki BK 117	1	1	1	1	—
MBB/Nurtanio Bo.105	9	34	34	34	33
Sikorsky S-55T	3	5	5	5	5
Sikorsky S-58T	11	13	7	5	5
Sikorsky S-61	37	41	34	32	10
Sikorsky S-76	20	27	19	18	11
Westland 30	—	—	3	3	3

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and covers aircraft in service as of March 31. Excludes air taxi operators.

U.S. TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

Calendar Years 1986 - 1990

	1986	1987	1988	1989	1990
TOTAL AIRCRAFT IN SERVICE	10,999	11,711	12,575	13,514	14,651
Number Manufactured in U.S.	7,284	7,699	8,193	8,663	9,340
Percent Manufactured in U.S.	66.2%	65.7%	65.2%	64.1%	63.7%
Turbojet Aircraft in Service	7,188	7,600	8,085	8,587	9,426
Number Manufactured in U.S.	5,971	6,313	6,693	7,029	7,737
Percent Manufactured in U.S.	83.1%	83.1%	82.8%	81.9%	82.1%
Turboprop Aircraft in Service	3,546	3,808	4,219	4,687	5,049
Number Manufactured in U.S.	1,116	1,184	1,332	1,497	1,519
Percent Manufactured in U.S.	31.5%	31.1%	31.6%	31.9%	30.1%
Turbine-Powered Helicopters In Service	265	303	271	240	176
Number Manufactured in U.S.	197	202	168	137	84
Percent Manufactured in U.S.	74.3%	66.7%	62.0%	57.1%	47.7%

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and includes aircraft in service as of March 31. Excludes air taxi operators.

JET FUEL COSTS AND CONSUMPTION BY U.S. AIR CARRIERS[a]

Calendar Years 1976 - 1990

Year	Gallons Consumed (Millions)	Total Cost (Millions)	Cost Per Gallon (Cents)	Cost Index (1972 = 100)	Cost of Fuel as Percent of Cash Operating Expenses
1976	9,820.8	$ 3,116.1	31.7¢	272.0	19.2%
1977	10,282.0	3,729.8	36.3	311.0	20.1
1978	10,627.1	4,178.2	39.3	337.1	19.7
1979	11,278.1	6,503.0	57.7	494.4	24.4
1980	10,874.0	9,769.5	89.8	770.3	29.7
1981	10,087.8	10,498.0	104.1	892.2	29.3
1982	9,942.1	9,755.2	98.1	841.2	27.2
1983	10,214.4	9,073.1	88.8	761.5	24.5
1984	11,050.4	9,361.7	84.7	726.3	23.8
1985	11,675.1	9,326.7	79.9	684.9	22.2
1986	12,643.0	6,995.8	55.3	474.4	16.3
1987r	13,629.5	7,593.8	55.7	477.7	16.0
1988r	14,204.8	7,557.2	53.2	456.1	14.4
1989	14,103.9r	8,472.7	60.1	515.0r	14.9
1990	14,921.6	11,465.2	76.8	658.7	17.6

Source: Air Transport Association of America, "Airline Cost Index" (Quarterly).
a Majors and Nationals excluding Air Florida, Capitol, Transamerica, and World.
r Revised from previously reported data for comparability.

U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES[a] BY TYPE AND STATE

As of December 31, 1990

State	TOTAL[a]	Public[b]	Paved	Lighted	State	TOTAL[a]	Public[b]	Paved	Lighted
Alabama	196	102	132	98	Nevada	119	60	57	31
Alaska	602	425	63	154	New Hampshire	74	27	43	19
Arizona	272	75	154	72	New Jersey	321	56	136	50
Arkansas	230	96	156	86	New Mexico	164	72	79	50
California	918	273	662	349	New York	497	169	201	129
Colorado	384	84	165	92	North Carolina	331	122	146	112
Connecticut	132	26	82	28	North Dakota	475	100	77	96
Delaware	33	10	13	12	Ohio	715	196	278	194
Dist. of Col.	16	2	14	4	Oklahoma	411	159	216	133
Florida	662	130	296	144	Oregon	370	102	150	74
Georgia	368	115	189	113	Pennsylvania	742	155	306	138
Hawaii	50	13	42	13	Rhode Island	24	8	16	7
Idaho	211	122	78	45	South Carolina	150	70	76	66
Illinois	928	125	269	167	South Dakota	159	76	62	75
Indiana	566	118	156	120	Tennessee	211	90	129	86
Iowa	273	141	141	142	Texas	1,692	408	842	418
Kansas	386	149	135	135	Utah	112	49	76	44
Kentucky	143	71	89	58	Vermont	66	18	16	11
Louisiana	426	90	239	75	Virginia	331	75	148	85
Maine	157	78	48	33	Washington	410	134	197	132
Maryland	158	38	67	47	West Virginia	94	40	56	32
Massachusetts	195	51	113	44	Wisconsin	476	143	176	137
Michigan	431	220	176	172	Wyoming	97	42	48	36
Minnesota	472	163	127	141	**50 States—Total**	17,419	5,548	7,649	4,798
Mississippi	207	89	113	80	Puerto Rico	29	11	24	11
Missouri	440	145	200	141	Virgin Islands	8	2	3	2
Montana	220	126	98	84	S. Pacific[c]	34	28	18	11
Nebraska	302	100	101	94	**TOTAL**	17,490	5,589	7,694	4,822

FACILITIES BY CLASS

Class	Total[a]	Public[b]	Private
Airports	12,920	5,276	7,644
Heliports	4,085	101	3,984
Stolports	70	6	64
Seaplane Bases	415	206	209
Total Facilities	17,490	5,589	11,901

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually)

a Included in these data are facilities having joint civil-military use.

b "Public" refers to use, whether publicly or privately owned.

c American Samoa, Guam, and Trust Territories.

ACTIVE[a] U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model
Active as of December 1986 - 1990

	1986	1987	1988	1989	1990
TOTAL	4,909	5,253	5,660	5,778	6,083
Turbojets—TOTAL	3,283	3,575	3,915	3,942	4,148
Four-Engine—TOTAL	322	382	427	428	432
Boeing 707	35	31	31	27	25
Boeing 747	150	156	171	180	190
B.Ae. 146	25	57	57	53	44
McDonnell Douglas DC-8	112	138	168	168	173
Three-Engine—TOTAL	1,466	1,469	1,542	1,459	1,438
Boeing 727	1,172	1,168	1,246	1,167	1,152
Lockheed L-1011	114	116	112	107	101
McDonnell Douglas DC-10	180	185	184	185	185
Twin-Engine—TOTAL	1,495	1,724	1,946	2,055	2,278
Airbus A-300	52	52	57	63	67
Airbus A-310	7	13	19	19	21
Airbus A-320	—	—	—	11	10
Boeing 737	555	633	706	756	812
Boeing 757	73	95	122	146	199
Boeing 767	69	83	126	111	120
B.Ae. BAC-111	45	39	30	—	3
Cessna C550	—	—	—	5	7
Fokker F-28	50	47	47	53	68
Grumman G-1159	—	—	—	—	1
Learjet LR-25	—	—	1	2	1
Learjet LR-35	1	2	1	1	2
McDonnell Douglas DC-9/MD-80	643	760	837	888	967
Turboprops—TOTAL	1,204	1,244	1,375	1,476	1,595
Four-Engine—TOTAL	96	102	95	95	88
Canadair CL44D	2	6	6	5	5
De Havilland DHC-7	40	41	39	41	40
Lockheed 188 Electra	33	34	30	30	24
Lockheed 382/L-100 Hercules	21	21	20	20	19
Twin-Engine—TOTAL	1,108	1,139	1,280	1,380	1,507
Beech BE65	1	4	1	—	—
Beech BE90	—	4	1	—	—
Beech BE99	95	52	84	53	54
Beech BE100	1	—	1	1	2
Beech BE200	2	5	7	10	16
Beech BE1900	60	48	80	109	147
B.Ae. ATP	—	—	—	—	4
B.Ae. Jetstream	69	113	135	165	222

(Continued on next page)

ACTIVE[a] U.S. AIR CARRIER FLEET (Continued)

By Type of Aircraft, Number of Engines, and Model
Active as of December 1986 - 1990

	1986	1987	1988	1989	1990
Twin-Engine (continued)					
CASA C212 Aviocar	19	16	18	16	16
Cessna C441	3	2	3	4	2
Convair 580/600/640	91	77	72	58	33
DeHavilland DHC-6	68	71	63	69	67
DeHavilland DHC-8	26	34	44	64	74
Dornier DO228	12	18	33	34	32
Embraer EMB110/EMB120	107	133	139	164	204
Fairchild/Fokker F-27/FH-227	63	47	51	53	58
Fairchild Swearingen SA-226	122	101	90	57	22
Fairchild Swearingen SA-227	135	163	191	212	218
Grumman G-73	—	—	7	5	7
Grumman G-159	15	14	5	6	7
Grumman G-500	—	—	1	—	—
Mitsubishi MU-2	6	1	—	—	1
Nihon YS-11	36	36	22	21	21
Nord ND-262/STC-262	15	12	9	2	1
Piper PA31T	5	6	9	12	8
Rockwell Aero Commander 690	4	1	1	—	—
Saab-Fairchild SF340A	34	51	68	85	109
Shorts SD-3/SD-330	110	110	110	118	103
Shorts SC-7	1	—	—	—	2
Societe Nationale Industrielle Aerospatiale SNAIS ATR-42	8	20	35	62	77
One-Engine—TOTAL	—	3	—	—	—
Cessna C208	—	3	—	—	—
Piston-Engine—TOTAL	420	421	362	353	329
Four-Engine—TOTAL	32	38	36	35	31
Douglas DC-4	1	—	—	—	—
Douglas DC-6	30	37	35	34	30
Douglas DC-7	1	1	1	1	1
Three-Engine—TOTAL	3	3	3	5	6
Pilatus Britten-Norman BN2A-MK-3 Turbo Islander	3	3	3	5	6
Twin-Engine—TOTAL	385	380	323	313	292
Helicopters—TOTAL	2	13	8	7	11

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).
NOTE: Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), multi-engine aircraft in passenger service of commuters, and all aircraft over 12,500 pounds operated by air taxis, commercial operators, and travel clubs.
a "Active aircraft" must have a current U.S. registration and have flown during the calendar year.

ACTIVE U.S. CIVIL AIRCRAFT[a]

As of December 31, 1963 - 1989

Year	TOTAL	Air Carrier[b]	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotor-craft[c]	Other[d]
				Multi Engine	Single-Engine			
					4-place & over	3-place & less		
1963	87,167	2,079	85,088	9,695	42,647	30,977	1,171	588
1964	90,799	2,057	88,742	10,644	45,777	30,367	1,306	648
1965	97,567	2,125	95,442	11,977	49,789	31,364	1,503	809
1966	106,978	2,272	104,706	13,548	52,972	35,687	1,622	877
1967	116,638	2,452	114,186	14,651	56,865	39,675	1,899	1,096
1968	126,823	2,586	124,237	16,760	60,977	42,830	2,350	1,320
1969	133,496	2,690	130,806	18,111	63,703	45,001	2,557	1,434
1970	134,422	2,679	131,743	18,291	64,759	44,884	2,255	1,554
1971	133,790	2,642	131,148	17,855	64,464	44,792	2,352	1,685
1972	147,593	2,583	145,010	19,849	70,998	49,448	2,787	1,928
1973	156,[illegible]	2,599	153,540	21,929	74,831	51,386	3,143	2,251
1974	163,9[illegible]	2,472	161,502	23,418	78,924	53,008	3,610	2,542
1975	170,970	2,495	168,475	24,559	82,621	54,390	4,073	2,832
1976	180,796	2,492	178,304	25,684	88,211	56,730	4,505	3,174
1977	186,767	2,473	184,294	26,652	91,960	57,340	4,726	3,616
1978	201,323	2,545	198,778	28,782	101,466	59,185	5,315	4,028
1979	213,948	3,609	210,339	31,311	106,028	62,362	5,864	4,770
1980	214,853	3,808	211,045	31,664	107,930	60,505	6,001	4,945
1981	217,199	3,973	213,226	33,301	107,983	59,914	6,974	5,049
1982	213,851	4,027	209,779	34,204	106,503	57,670	6,169	6,209
1983	217,496	4,203	213,293	34,404	107,228	59,199	6,540	5,233
1984	225,313	4,370	220,943	35,649	109,933	61,989	7,096	6,275
1985	215,332	4,678	210,654	33,589	105,555	58,829	6,418	6,263
1986	224,953	4,909	220,044	34,313	109,351	62,427	6,943	7,010
1987	222,436	5,253	217,183	33,032	107,502	63,533	6,333	6,783
1988	215,926	5,660	210,266	32,243	105,207	59,553	6,406	6,857
1989	225,515	5,778	219,737	34,171	107,333	63,037	7,475	7,721

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

a "Active aircraft" must have a current U.S. registration and have flown during the calendar year. Prior to 1971, only a current U.S. registration was necessary.

b Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), multi-engine aircraft in commuter passenger service, and all aircraft over 12,500 pounds operated by air taxis, commercial operators, and travel clubs.

c Includes autogiros; excludes air carrier helicopters.

d Includes gliders, dirigibles, and balloons.

ACTIVE U.S. CIVIL AIRCRAFT BY PRIMARY USE AND TYPE OF AIRCRAFT

As of December 31, 1989

Primary Use[a]	TOTAL	Fixed-Wing			Rotor-craft[b]	Other[c]
		Turbojet	Turboprop	Piston		
TOTAL—ALL AIRCRAFT	225,515	8,344	7,800	194,168	7,482	7,721
Air Carrier—TOTAL	5,778	3,942	1,476	353	7	—
Large	4,477	3,939	447	91	—	—
Small	1,301	3	1,029	262	7	—
General Aviation—TOTAL	219,737	4,402	6,324	193,815	7,475	7,721
Executive	12,285	3,194	3,412	4,919	727	33
Business	37,507	259	695	36,032	416	104
Commuter[d]	1,444	32	662	631	21	99
Air Taxi[d]	7,115	367	689	4,431	1,629	—
Instructional	17,780	25	86	16,430	694	545
Personal	124,786	114	159	117,719	1,068	5,725
Aerial Application	7,093	—	136	6,125	832	—
Aerial Observation	5,784	50	60	4,056	1,297	322
Other Work	2,139	14	21	1,096	363	645
Other	3,802	347	404	2,374	429	248

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).
NOTE: Detail may not add to totals because of estimating procedures.
a Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."
b Includes helicopters and autogiros.
c Includes gliders, dirigibles, and balloons.
d Limited to single-engine commuters or Air Taxis under 12,500 pounds. Otherwise, aircraft included in "Air Carrier."

U.S. GENERAL AVIATION
ACTIVE AIRCRAFT AND HOURS FLOWN
BY PRIMARY USE

Calendar Years 1985 - 1989

Primary Use[a]	1985	1986	1987	1988	1989
ACTIVE AIRCRAFT AS OF DECEMBER 31					
TOTAL	210,654	220,044	217,183	210,266	219,737
Executive	13,610	12,075	11,960	10,882	12,285
Business	45,544	43,780	39,943	34,918	37,507
Commuter[b]	875	1,721	1,014	973	1,444
Air Taxi[b]	6,459	7,568	6,228	6,518	7,115
Instructional	14,410	15,812	15,727	16,674	17,780
Rental[c]	7,919	—	—	—	—
Personal	103,053	120,308	123,487	122,557	124,786
Aerial Application	7,286	7,068	6,516	7,042	7,093
Aerial Observation	4,533	4,716	4,858	4,759	5,784
Other Work	1,620	1,274	1,577	1,841	2,139
Other	5,344	5,707	5,873	4,081	3,802
THOUSANDS OF HOURS FLOWN					
TOTAL	34,063	34,416	33,443	33,593	35,012
Executive	4,176	3,781	3,403	3,748	3,739
Business	6,534	5,896	5,713	4,960	4,689
Commuter[b]	674	2,185	1,359	1,118	1,508
Air Taxi[b]	2,719	2,913	2,877	2,842	3,270
Instructional	4,264	4,677	4,904	5,309	6,489
Rental[c]	2,646	—	—	—	—
Personal	8,392	10,097	10,787	10,813	10,328
Aerial Application	2,168	1,985	1,666	1,989	2,023
Aerial Observation	1,315	1,620	1,412	1,412	1,861
Other Work	343	323	379	567	560
Other	831	939	943	835	549

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).
NOTE: Detail may not add to totals because of rounding and estimating procedures.
a Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."
b Limited to single-engine commuters or air taxis under 12,500 pounds.
c Rental is not reported as a separate use category after 1985.

U.S. GENERAL AVIATION
TYPE OF AIRCRAFT AND HOURS FLOWN

Calendar Years 1985 - 1989

	1985	1986	1987	1988	1989
Number of Active Aircraft by Type					
All Aircraft—TOTAL	210,654	220,044	217,183	210,266	219,737
Fixed Wing: Piston:					
Single Engine: 1-3 Seats	58,829	62,427	63,533	59,553	62,618
4 + Seats	105,555	109,351	107,502	105,207	107,752
Twin Engine: 1-6 Seats	15,627	16,166	15,741	15,143	15,927
7 + Seats	8,032	7,555	7,566	7,554	7,432
Other	148	148	112	99	86
Turboprop:					
Twin Engine: 1-12 Seats	4,633	4,809	4,337	4,231	4,888
13 + Seats	607	970	723	826	1,206
Other	167	185	214	202	230
Turbojet: Twin Engine	3,914	4,037	3,900	3,821	4,004
Other	460	444	438	367	398
Rotorcraft: Piston	2,877	2,921	2,813	2,584	3,244
Turbine	3,541	4,022	3,520	3,822	4,232
Balloons, Dirigibles, and Gliders	6,263	7,010	6,783	6,857	7,721
Thousands of Hours Flown by Type of Aircraft					
All Aircraft—TOTAL	34,063	34,416	33,443	33,593	35,012
Fixed Wing: Piston	27,793	26,861	27,039	26,226	26,971
Turboprop	2,080	2,882	2,177	2,370	3,132
Turbojet	1,622	1,654	1,528	1,678	1,654
Rotorcraft: Piston	564	804	652	576	749
Turbine	1,590	1,821	1,631	2,131	2,077
Balloons, Dirigibles, and Gliders	414	394	416	613	429
Average Hours Flown per Year per Aircraft by Type					
All Aircraft—TOTAL	158	149	148	154	155
Fixed Wing: Piston:					
Single Engine: 1-3 Seats	135	125	134	132	132
4 + Seats	142	130	126	134	131
Twin Engine: 1-6 Seats	174	172	165	150	169
7 + Seats	274	280	289	256	259
Other	184	111	140	225	133
Turboprop:					
Twin Engine: 1-12 Seats	342	335	337	373	341
13 + Seats	831	1,013	652	895	1,044
Other	397	499	839	392	569
Turbojet: Twin Engine	375	385	371	412	385
Other	325	154	229	347	275
Rotorcraft: Piston	192	273	229	228	236
Turbine	460	460	485	577	497
Balloons, Dirigibles, and Gliders	67	56	62	95	56

Source: General Aviation Manufacturers Association, "General Aviation Statistical Databook" (Annually), based on data from the Federal Aviation Administration, "FAA Statistical Handbook of Aviation" and the Federal Aviation Administration, Office of Management Systems.

NOTE: Detail may not add to totals because of rounding and/or estimating procedures.

ACTIVE U.S. AIRMAN CERTIFICATES HELD

As of December 31, 1986 - 1990

	1986	1987	1988	1989	1990
Pilots—TOTAL	709,118	699,653	694,016	700,010	702,659
Students	150,273	146,016	136,913	142,544	128,663
Private	305,736	300,949	299,786	293,179	299,111
Commercial	147,798	143,645	143,030	144,540	149,666
Airline Transport	87,186	91,287	96,968	102,087	107,732
Helicopter (only)	8,581	8,702	8,608	8,863	9,567
Glider (only)[a]	8,411	7,901	7,600	7,708	7,833
Lighter-Than-Air[a]	1,133	1,153	1,111	1,089	(b)
Recreational	—	—	—	—	87
Non-Pilots—TOTAL	410,079	427,962	448,710	468,405	492,237
Mechanics[c]	284,241	297,178	312,419	326,243	344,282
Parachute Rigger[c]	9,535	9,659	9,770	9,879	10,094
Ground Instructor[c]	59,443	60,861	62,582	64,503	66,882
Dispatcher[c]	9,025	9,491	10,020	10,455	11,002
Flight Navigator	1,512	1,445	1,400	1,357	1,290
Flight Engineer	46,323	49,328	52,519	55,968	58,687
Flight Instructor Certificates[d]	57,355	60,316	61,798	61,472	63,775
Instrument Ratings[d]	262,388	266,122	273,804	282,804	297,073

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

a Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above are the pilots who received a medical.

b Lighter-than-air type ratings are no longer being issued.

c No periodic medical examination required; therefore, no determination as to current activity can be made.

d Special ratings shown on pilot certificates represented above, not additional certificates.

HELIPORTS/HELIPADS[a] IN THE UNITED STATES

By State
As of 1990

State	Total Helipads in state	Private Use		Public Use	
		Heliports & Helistops	Helipads at Airports	Heliports & Helistops	Helipads at Airports
Alabama	66	64	—	1	1
Alaska	32	14	3	7	8
Arizona	99	97	—	—	2
Arkansas	70	67	2	—	1
California	393	369	3	—	21
Colorado	172	166	1	1	4
Connecticut	73	69	1	2	1
Delaware	14	13	—	1	—
District of Columbia	21	20	—	—	1
Florida	208	204	—	3	1
Georgia	97	96	—	—	1
Hawaii	19	16	—	—	3
Idaho	29	28	—	—	1
Illinois	238	229	3	6	—
Indiana	99	92	2	4	1
Iowa	58	57	—	—	1
Kansas	30	26	—	—	4
Kentucky	32	31	—	1	—
Louisiana	250	242	2	5	1
Maine	13	12	—	1	—
Maryland	46	44	2	—	—
Massachusetts	112	109	—	1	2
Michigan	58	56	1	1	—
Minnesota	27	24	1	—	2
Mississippi	28	28	—	—	—
Missouri	91	84	1	3	3
Montana	22	20	—	2	—
Nebraska	21	20	1	—	—
Nevada	27	27	—	—	—
New Hampshire	32	30	—	1	1

(Continued on next page)

HELIPORTS/HELIPADS[a] IN THE UNITED STATES (Continued)

By State
As of 1990

State	Total Helipads in state	Private Use		Public Use	
		Heliports & Helistops	Helipads at Airports	Heliports & Helistops	Helipads at Airports
New Jersey	202	199	—	3	—
New Mexico	19	17	—	2	—
New York	121	109	—	12	—
North Carolina	57	54	1	2	—
North Dakota	7	7	—	—	—
Ohio	200	176	1	18	5
Oklahoma	91	86	—	5	—
Oregon	88	83	2	3	—
Pennsylvania	272	261	1	10	—
Rhode Island	12	11	—	1	—
South Carolina	23	23	—	—	—
South Dakota	8	8	—	—	—
Tennessee	65	59	2	3	1
Texas	463	446	3	12	2
Utah	36	31	—	—	5
Vermont	16	16	—	—	—
Virginia	97	95	—	1	1
Washington	104	98	2	—	4
West Virginia	24	24	—	—	—
Wisconsin	65	65	—	—	—
Wyoming	15	14	—	—	1
Total U.S.	4,462	4,236	35	112	79

Source: Helicopter Association International, "1991 Helicopter Annual" (Annually).
NOTE: 95.6 percent of all U.S. helicopter landing areas are private, while 4.4 percent are public.
a Excludes temporary heliports, offshore heliports, and infrequently used helicopter landing sites.

91-92

Research and Development

Aerospace industry company-funded research and development in 1991 is expected to drop by more than $117 million to a level of $6.8 billion. Federal aerospace R&D funding estimates beyond 1990 are unavailable, preventing a total picture of aerospace R&D investment.

The estimate of company funding incorporates data from two separate surveys: Battelle Memorial Institute's 1990 publication, *Probable Levels of R&D Expenditures,* and the National Science Foundation (NSF) report, *Planned R&D Expenditures of Major U.S. Firms: 1990-91.* Battelle listed 1990 aerospace company outlays for R&D at $6.9 billion; NSF estimated that aerospace companies would reduce 1991 funded R&D 1.7 percent below the 1990 figure.

In another report *(Annual Survey of Industrial Research and Development),* NSF estimated total U.S. funding for R&D from all sources at $151.6 billion for 1991; this represents an increase of more than four percent above the 1990 level of $145.5 billion. A breakdown of funding sources estimates that U.S. industry will spend $78 billion, or more than 51 percent of the total. Federal government funding is expected to amount to $66 billion. Colleges and universities will spend $5 billion and nonprofit institutions will spend $2.6 billion.

The NSF report estimates that industry will perform more than 71 percent of the 1991 R&D, using dollar value as the yardstick. Other performer's percentages (regardless of funding source) are: colleges and universities, 11.3 percent; federal government, 10.8 percent; federally-funded R&D centers, 3.2 percent; and nonprofit institutions, 3.1 percent.

The Office of Management and Budget (OMB) estimates fiscal year 1991 federal outlays for R&D at $63.4 billion,

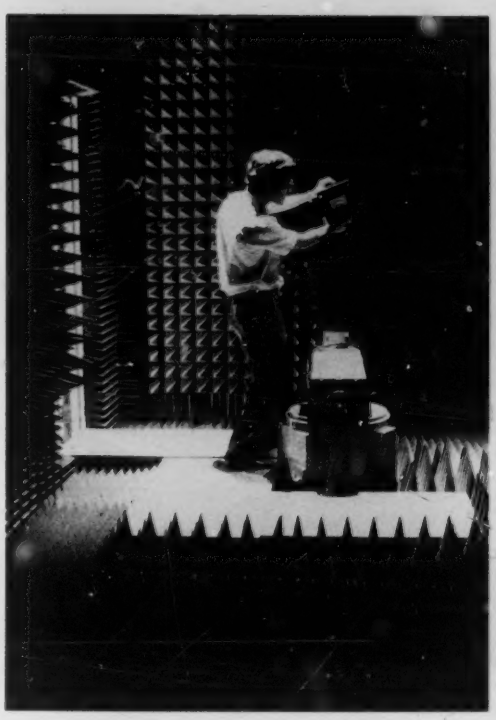
compared with $62.1 billion in FY 1990; in inflation-adjusted constant dollars, however, the figure represents a decline of more than two percent. For FY 1992, OMB estimates outlays of $68.1 billion, which would amount to a real-term increase.

A breakdown of the FY 1991 estimates shows—as usual—that the Department of Defense is by far the largest conductor of government-funded R&D. OMB estimates DoD FY 1991 outlays at $36.1 billion, or 57 percent of the total. Among other agencies, NASA outlays are estimated at $7 billion (11 percent) and the Department of Energy at $5.8 billion (9 percent).

DoD outlays will continue to increase in FY 1992, according to OMB estimates, which list DoD at $38.4 billion (up $2.3 billion); NASA at $7.8 billion (up $793 million); the Department of Energy at $6.3 billion (up $463 million); and all other federal agencies at $15.6 billion (up $1.1 billion).

Within the Department of Defense, the Air Force continues to lead the other services in appropriations for Research, Development, Test and Evaluation

(RDT&E). For FY 1991, the USAF appropriations was $11.7 billion (down from $13.6 billion in FY 1990) and the estimate for FY 1992 is $15.2 billion. The



Navy figures are $8.3 billion in FY 1991 (down $1.2 billion) and $8.2 billion in FY 1992. Army appropriations for RDT&E were $5.4 billion in FY 1991 (up from $5.3 billion) and $6.2 billion in FY 1992.

The Pacific region, perennial leader, again topped a geographical breakdown of FY 1990 prime contract awards for RDT&E. Pacific area firms won $7.4 billion in prime contract awards, or 33.9 percent of the total.

The ranking and dollar value of contracts received by other regions was: Mountain, $3.0 billion, 13.6 percent; South Atlantic, $2.9 billion, 13.2 percent; New England, $2.5 billion, 11.3 percent; Middle Atlantic, $2.1 billion, 9.8 percent; West North Central $1.4 billion, 6.6 percent; East North Central, $1.2 billion, 5.5 percent; West South Central, $698 million, 3.2 percent; and East South Central, $627 million, 2.9 percent.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT - ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

By Funding Source
Calendar Years 1975 - 1989
(Millions of Dollars)

Year	All Industries[a]			Aerospace Industry[b]		
	Total	Federal Funds	Company Funds[c]	Total	Federal Funds	Company Funds[c]
CURRENT DOLLARS						
1975	$ 24,187	$ 8,605	$15,582	$ 5,713	$ 4,428	$1,285
1976	26,997	9,561	17,436	6,339	4,921	1,418
1977	29,825	10,485	19,340	7,033	5,486	1,547
1978	33,304	11,189	22,115	7,536	5,713	1,823
1979	38,226	12,518	25,708	8,041	5,840	2,201
1980	44,505	14,029	30,476	9,198	6,628	2,570
1981	51,810	16,382	35,428	11,968	8,528	3,440
1982	58,650	18,545	40,105	14,451	10,265	4,186
1983	65,268	20,680	44,588	15,406	11,396	4,010
1984	74,800	23,396	51,404	18,858	14,094	4,764
1985	84,239	27,196	57,043	22,231	16,582	5,649
1986	87,823[r]	27,891[r]	59,932	21,050	14,984	6,066
1987[r]	92,155	30,752	61,403	24,458	18,519	5,939
1988[r]	97,889	32,306	65,583	25,900	19,877	6,023
1989	101,599	31,366	70,233	25,654	19,634	6,020
CONSTANT DOLLARS (1982 = 100)[d]						
1975	$ 40,781	$14,509	$26,272	$ 9,632	$ 7,466	$2,167
1976	42,805	15,159	27,645	10,051	7,802	2,248
1977	44,330	15,584	28,746	10,453	8,154	2,299
1978	46,115	15,493	30,622	10,435	7,911	2,524
1979	48,652	15,932	32,720	10,234	7,433	2,801
1980	51,919	16,366	35,553	10,730	7,732	2,998
1981	55,140	17,435	37,705	12,737	9,076	3,661
1982	58,650	18,545	40,105	14,451	10,265	4,186
1983	62,842	19,911	42,931	14,833	10,972	3,861
1984	69,433	21,717	47,716	17,505	13,083	4,422
1985	75,925	24,512	51,413	20,037	14,945	5,091
1986	77,160[r]	24,504[r]	52,655	18,494	13,165	5,329
1987[r]	78,477	26,188	52,289	20,828	15,770	5,057
1988[r]	80,680	26,627	54,053	21,347	16,383	4,964
1989	80,436	24,833	55,604	20,310	15,544	4,766

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).
NOTE: Detail may not add to totals because of rounding.

a Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

c Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

d Based on GNP implicit price deflator.

r Revised.

TOTAL U.S. FUNDS FOR RESEARCH AND DEVELOPMENT BY SOURCE AND PERFORMER[a]

Calendar Years 1988 - 1991
(Millions of Current Dollars)

Source of Funds	TOTAL, All Performers	Performer				
		Federal Government	Industry	Colleges & Universities	Federally-Funded Research & Development Centers	Non-Profit Institutions
1988						
All Sources—TOTAL	$133,741	$14,281	$ 97,889	$13,465	$4,531	$3,575
Federal Government	61,499	14,281	32,306	8,181	4,531	2,200
Industry	66,953	—	65,583	870	—	500
Colleges & Universities	3,473	—	—	3,473	—	—
Nonprofit Institutions	1,816	—	—	941	—	875
1989						
All Sources—TOTAL	$140,486	$15,121	$101,599	$14,987	$4,729	$4,050
Federal Government	62,688	15,121	31,366	8,972	4,729	2,500
Industry	71,767	—	70,233	984	—	550
Colleges & Universities	3,948	—	—	3,948	—	—
Nonprofit Institutions	2,083	—	—	1,083	—	1,000
1990[p]						
All Sources—TOTAL	$145,450	$16,100	$104,200	$16,000	$4,800	$4,350
Federal Government	64,000	16,100	31,200	9,250	4,800	2,650
Industry	74,700	—	73,000	1,100	—	600
Colleges & Universities	4,450	—	—	4,450	—	—
Nonprofit Institutions	2,300	—	—	1,200	—	1,100
1991[E]						
All Sources—TOTAL	$151,600	$16,400	$108,450	$17,200	$4,850	$4,700
Federal Government	66,000	16,400	32,300	9,650	4,850	2,800
Industry	78,050	—	76,150	1,250	—	650
Colleges & Universities	4,950	—	—	4,950	—	—
Nonprofit Institutions	2,600	—	—	1,350	—	1,250

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).
a Source performer detail not available by industry.
E Estimate.
p Preliminary.

ESTIMATED SOURCES OF FUNDS FOR R&D BY BROAD INDUSTRIAL CLASSES, 1990[a]

(Millions of Dollars)

	Federal Funds	Industry Funds	Total Funds	% Federal
Aerospace	$17,388	$ 6,876	$ 24,264	71.66%
Electrical Machinery and Communications	6,091	10,100	16,191	37.62
Machinery	1,894	13,066	14,960	12.66
Chemicals	221	10,542	10,763	2.06
Autos, Trucks and Parts, & Other Transportation Equipment	1,505	9,350	10,855	13.86
Professional & Scientific Instruments	661	3,580	4,241	15.59
Petroleum Products	19	1,859	1,878	1.01
Rubber Products	330	1,102	1,432	23.08
Food and Beverage	—	1,523	1,523	—
Paper and Pulp	—	684	684	—
Fabricated Metals	121	1,101	1,222	9.91
Stone, Clay, and Glass	50	1,090	1,140	4.39
Nonferrous Metals	20	329	349	5.66
Iron & Steel	—	620	620	—
Textiles	—	259	259	—
Other Manufacturing	15	960	975	1.54
Total Manufacturing	$28,316	$63,040	$ 91,356	31.00
Non-manufacturing	5,543	3,167	8,710	63.64
TOTAL	$33,859	$66,207	$100,066	33.84

Source: Battelle Memorial Institute, "Probable Levels of R&D Expenditures" (Annually).
NOTE: The aerospace industry plans to reduce company-funded R&D by 1.7% in 1991, according to NSF report titled, "Planned R&D Expenditures of Major U.S. Firms: 1990-91."
a Battelle data, derived from the National Science Foundation and McGraw-Hill surveys.

RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1978 - 1989

Year	All Manufacturing Industries[a]		Aerospace Industry[b]	
	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales
1978	2.9%	2.0%	13.3%	3.2%
1979	2.6	1.9	12.9	3.5
1980	3.0	2.1	13.7	3.8
1981	3.1	2.2	16.0	4.6
1982	3.8	2.6	17.1	5.1
1983	3.9	2.6	15.2	4.1
1984	3.9	2.6	15.4	4.0
1985	4.4	3.0	14.9	3.9
1986	4.7	3.2	13.4	4.0
1987	4.6	3.1	14.7	3.6
1988[r]	4.7	3.1	15.6	3.6
1989	4.7	3.1	15.5	3.6

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).

a Includes all manufacturing industries known to conduct or finance research and development.

b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

r Revised.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Fiscal Years 1973 - 1991
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD[b]	DOT[c]
BUDGET AUTHORITY				
1973	$ 2,187	$ 313	$1,799	$ 75
1974	2,030	278	1,678	74
1975	2,015	314	1,627	74
1976	2,351	325	1,941	85
Tr.Qtr.	584	83	480	22
1977	2,727	378	2,256	93
1978	3,338	437	2,807	94
1979	2,850	519	2,240	91
1980	2,991	560	2,336	95
1981	3,286	526	2,653	106
1982	3,581	516	2,984	81
1983	3,871	547	3,221	103
1984	4,087	600	3,224	263
1985	4,355	648	3,422	265
1986	6,660	601	4,927	1,132
1987	5,824	698	4,179	946
1988	6,974	723	4,989	1,262
1989	10,656	872	8,240	1,544
1990	11,375	932	8,552	1,891
1991[E]	12,324	1,044	8,979	2,300
OUTLAYS				
1982[d]	$ 3,309	$ 563	$2,657	$ 89
1983	3,554	563	2,920	71
1984	3,727	586	2,995	146
1985	4,010	643	3,101	266
1986	6,071	648	4,373	1,050
1987	5,866	622	4,182	1,062
1988	6,340	679	4,448	1,213
1989	8,491	855	6,420	1,216
1990	10,071	889	7,711	1,471
1991[E]	11,227	1,040	8,317	1,870

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
a Research and Development, Construction of Facilities, Research and Program Management.
b Research, Development, Test, and Evaluation of aircraft and related equipment.
c Federal Aviation Administration: Research, Engineering, and Development; and Facilities, Engineering, and Development.
d First year outlays data available.
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT IN CONSTANT DOLLARS[a]

Fiscal Years 1973 - 1991
(Millions of Constant Dollars, 1982 = 100)

Year	TOTAL	NASA[b]	DOD[c]	DOT[d]
BUDGET AUTHORITY				
1973	$4,523	$647	$3,721	$ 155
1974	3,892	533	3,217	142
1975	3,503	546	2,829	129
1976	3,787	524	3,127	137
Tr.Qtr.	905	129	744	34
1977	4,068	564	3,366	139
1978	4,654	609	3,914	131
1979	3,659	666	2,875	117
1980	3,530	661	2,757	112
1981	3,525	564	2,846	114
1982	3,581	516	2,984	81
1983	3,714	525	3,090	99
1984	3,778	555	2,980	243
1985	3,905	581	3,068	238
1986	5,851	528	4,329	995
1987	4,960	594	3,559	806
1988	5,748	596	4,112	1,040
1989	8,436	690	6,524	1,222
1990	8,643	708	6,498	1,437
1991[E]	8,969	760	6,534	1,674
OUTLAYS				
1982[e]	$3,309	$563	$2,657	$ 89
1983	3,410	540	2,801	68
1984	3,445	542	2,768	135
1985	3,595	577	2,780	239
1986	5,334	569	3,842	923
1987	4,995	530	3,561	904
1988	5,225	560	3,666	1,000
1989	6,722	677	5,083	963
1990	7,652	675	5,859	1,118
1991[E]	8,170	757	6,053	1,361

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
a Based on Fiscal Year GNP implicit price deflator.
b Research and Development, Construction of Facilities, Research and Program Management.
c Research, Development, Test, and Evaluation of aircraft and related equipment.
d Federal Aviation Administration: Research, Engineering, and Development; and Facilities, Engineering, and Development.
e First year outlays data available.
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT IN THE AEROSPACE INDUSTRY

By Type of Research and Funding Source
Calendar Years 1963 - 1988
(Millions of Dollars)

Year	TOTAL AERO-SPACE	Basic Research			Applied Research			Development		
		Total	Federal Funds	Com-pany Funds	Total	Federal Funds	Com-pany Funds	Total	Federal Funds	Com-pany Funds
1963	$ 4,712	$ 59	$ 31	$ 28	$ 735	$ 585	$ 150	$ 3,917	$ 3,634	$ 283
1964	5,078	67	34	34	766	607	159	4,244	3,948	296
1965	5,148	71	41	30	735	563	172	4,342	3,921	421
1966	5,526	69	36	33	773	563	210	4,685	4,162	523
1967	5,669	71	33	38	726	490	236	4,871	4,071	800
1968	5,765	68	26	42	677	426	251	5,021	4,145	876
1969	5,882	65	24	41	597	347	250	5,220	4,216	1,004
1970	5,219	63	20	43	565	352	213	4,591	3,718	873
1971	4,881	54	37	17	461	279	182	4,365	3,583	782
1972	4,950	60	44	16	451	267	184	4,438	3,722	716
1973	5,052	50	21	29	512	308	204	4,491	3,633	858
1974	5,278	51	19	32	609	360	249	4,617	3,735	882
1975	5,713	54	17	37	614	381	233	5,044	4,119	925
1976	6,339	54	21	33	666	365	301	5,619	4,521	1,098
1977	7,033	56	25	31	753	419	334	6,223	5,017	1,206
1979[a]	8,041	86	44	42	880	499	381	7,076	5,314	1,762
1981[a]	11,968	131	60	71	1,484	897	587	10,353	7,738	2,615
1983	13,853	146	NA	NA	3,466	NA	NA	10,241	7,668	2,573
1984	16,033	247	NA	NA	3,067	NA	NA	12,718	9,870	2,848
1985	17,619	304	162	142	3,785	2,776	1,009	13,530	10,483	3,047
1986	21,050	311	208	103	3,198	1,571	1,627	17,541	13,205	4,336
1987	24,488	425	335	90	2,949	1,709	1,239	21,115	16,475	4,640
1988	25,667	365	264	102	2,990	1,883	1,106	22,312	17,668	4,644

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Break-outs by Research Type and Funding Source availabie only for odd-numbered years between 1977 and 1983.
NA Not available.

FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1978 - 1992
(Millions of Dollars)

Year	TOTAL	DOD	NASA	Energy	Other
CURRENT DOLLARS					
1978	$24,532	$10,726	$3,833	$3,925	$ 6,048
1979	26,578	11,454	4,064	4,413	6,648
1980	30,351	13,451	4,711	4,698	7,492
1981	34,252	15,720	5,279	5,121	8,132
1982	34,509	18,201	3,220	4,974	8,114
1983	36,560	21,057	2,538	4,771	8,193
1984	40,518	23,583	3,539	4,702	8,694
1985	45,244	27,878	2,970	4,900	9,496
1986	51,576	33,292	3,432	4,705	10,147
1987	52,862	34,581	3,250	4,682	10,349
1988	56,018	35,417	3,832	4,989	11,780
1989	61,172	37,819	4,975	5,887	12,491
1990	62,085	37,064	5,773	5,599	13,649
1991[E]	63,436	36,142	6,974	5,810	14,510
1992[E]	68,065	38,421	7,767	6,273	15,604
CONSTANT DOLLARS (1982 = 100)[a]					
1978	$34,205	$14,955	$5,344	$5,473	$ 8,433
1979	34,118	14,703	5,217	5,665	8,534
1980	35,817	15,873	5,559	5,544	8,841
1981	36,747	16,865	5,664	5,494	8,724
1982	34,509	18,201	3,220	4,974	8,114
1983	35,076	20,202	2,435	4,577	7,861
1984	37,451	21,798	3,271	4,346	8,036
1985	40,567	24,996	2,663	4,393	8,514
1986	45,041	29,073	2,997	4,109	8,861
1987	44,787	29,298	2,754	3,967	8,768
1988	46,060	29,121	3,151	4,102	9,686
1989	48,266	29,840	3,925	4,645	9,856
1990	47,098	28,117	4,379	4,247	10,354
1991[E]	46,082	26,255	5,066	4,221	10,540
1992[E]	47,502	26,813	5,420	4,378	10,890

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Based on Fiscal Year GNP implicit price deflator.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.

DEPARTMENT OF DEFENSE APPROPRIATIONS FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

Fiscal Years 1990 - 1992
(Millions of Dollars)

	1990	1991[E]	1992[E]
TOTAL—APPROPRIATIONS FOR RDT&E	$36,632	$34,555	$39,923
BY APPROPRIATION			
Army	$ 5,300	$ 5,353	$ 6,236
Navy	9,511	8,345	9,199
Air Force	13,585	11,687	15,155
Defense Agencies	8,045	8,909	10,033
Director of Test & Evaluation, Defense	178	237	286
Director of Operational Test & Evaluation, Defense	13	14	14
BY RESEARCH CATEGORIES			
Research	$ 936	$ 1,125	$ 1,010
Exploratory Development	2,408	2,734	2,860
Advanced Development	10,249	10,525	11,128
Engineering Development	11,025	9,050	11,135
Management and Support	2,775	2,689	2,960
Operational Systems Development	9,238	8,442	10,830
RECAP OF BUDGET ACTIVITIES[a]			
Technology Base	$ 3,345	$ 3,849	$ 3,870
Advanced Technology Development	5,833	5,199	7,225
Strategic Programs	5,193	4,300	5,159
Tactical Programs	13,237	12,815	14,237
Intelligence and Communications	4,791	4,474	5,184
Defensewide Mission Support	4,233	4,018	4,248
RECAP OF FYDP PROGRAMS			
Strategic Forces	$ 550	$ 831	$ 621
General Purpose Forces	2,023	1,962	2,724
Intelligence and Communications	6,235	5,225	7,053
Airlift/Sealift	15	23	14
Guard and Reserve	18	—	—
Research and Development (FYDP Program 6)	27,394	26,113	29,092
Central Supply and Maintenance	220	302	134
Administration and Associated Activities	4	(97)	5
Support of Other Nations	5	6	4
Special Operations Forces	169	191	276

Source: Department of Defense Budget, "R,D,T&E Programs (R-1)" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Excludes $101 million in undistributed funds for FY 1990.
E Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE
OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

Fiscal Years 1972 - 1993
(Millions of Dollars)

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1972	$ 7,881	$ 3,205	$2,427	$1,779	$ 470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr.Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,382	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982	17,729	7,794	5,240	3,230	1,465
1983	20,554	9,182	5,854	3,658	1,861
1984	23,117	10,353	6,662	3,812	2,289
1985	27,103	11,573	8,054	3,950	3,527
1986	32,283	13,417	9,667	3,984	5,215
1987	33,596	13,347	9,176	4,721	6,352
1988	34,792	14,302	8,828	4,624	7,038
1989	37,002	14,912	9,291	4,966	7,833
1990	37,458	14,443	9,160	5,513	8,342
1991[E]	35,543	12,869	8,853	5,209	8,612
1992[E]	37,841	14,114	8,399	5,771	9,557
1993[E]	39,746	14,759	8,892	5,911	10,183

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).
E Estimate. Latest year reflects Administration's budget proposal.
Tr.Qtr. See Glossary.

DEPARTMENT OF DEFENSE
PRIME CONTRACT AWARDS
FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

Fiscal Years 1986 - 1990
(Millions of Dollars)

Program Categories	1986	1987	1988	1989	1990
TOTAL—RDT&E	$19,812	$21,809	$22,543	$23,206	$22,319
Research	1,664	1,730	1,444	1,429	994
Exploratory Development	1,494	1,524	1,623	1,581	1,813
Other Development	15,870	17,964	18,937	18,966	18,697
Management & Support	784	592	538	1,230	815
Aircraft—TOTAL	$ 3,160	$ 3,561	$ 5,055	$ 4,689	$ 4,364
Research	591	437	139	11	(191)
Exploratory Development	106	103	125	85	82
Other Development	2,449	3,007	4,777	4,563	4,431
Management & Support	14	14	14	30	42
Missile and Space Systems—TOTAL	6,873	7,943	7,800	6,962	6,865
Research	22	64	106	260	175
Exploratory Development	325	356	340	331	308
Other Development	6,401	7,401	7,218	6,277	6,291
Management & Support	125	122	135	95	91
Electronics & Communications Equipment—TOTAL	4,515	4,637	3,854	3,744	3,925
Research	122	162	137	182	188
Exploratory Development	325	280	251	289	327
Other Development	3,983	4,117	3,417	3,190	3,337
Management & Support	86	79	49	83	73
All Other—TOTAL[a]	5,264	5,668	5,834	7,811	7,165
Research	930	1,067	1,062	976	822
Exploratory Development	738	785	907	876	1,097
Other Development	3,037	3,439	3,525	4,936	4,637
Management & Support	559	377	340	1,022	609

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).
NOTE: Detail may not add to totals because of rounding.
a "All Other" includes ships, tank-automotive, weapons, ammunition, services, and other.

DEPARTMENT OF DEFENSE
NET VALUE OF PRIME CONTRACT AWARDS OVER $25,000 FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

By Region and Type of Contractor
Fiscal Year 1990

REGION	TOTAL	Type of Contractor		
		Educational Institutions	Other Non-Profit Institutions[a]	Business Firms
TOTAL—Millions of Dollars	$21,791	$1,029	$1,728	$19,034
New England	$ 2,461	$ 493	$ 455	$ 1,514
Middle Atlantic	2,134	130	76	1,928
East North Central	1,201	58	71	1,072
West North Central	1,438	11	4	1,423
South Atlantic	2,871	86	527	2,258
East South Central	627	18	5	605
West South Central	698	28	45	624
Mountain	2,974	85	2	2,887
Pacific[b]	7,388	120	544	6,723
PERCENT OF TOTAL	100.0%	100.0%	100.0%	100.0%
New England	11.3%	47.9%	36.3%	8.0%
Middle Atlantic	9.8	12.7	4.4	10.1
East North Central	5.5	5.7	4.1	5.6
West North Central	6.6	1.1	0.2	7.5
South Atlantic	13.2	8.4	30.5	11.9
East South Central	2.9	1.7	0.3	3.2
West South Central	3.2	2.8	2.6	3.3
Mountain	13.6	8.2	0.1	15.2
Pacific[b]	33.9	11.7	31.5	35.3

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Includes contracts with other government agencies.
b Includes Alaska and Hawaii.

MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION[a]

By Agency, Type, and Model
Fiscal Years 1990, 1991, and 1992
(Millions of Dollars)

Agency, Type, and Model	1990	1991[E]	1992[E]
AIR FORCE			
ACM	$ 42.0	$ 51.8	$108.7
*AGM-130	3.5	11.1	21.7
AMRAAM[b]	17.7	34.8	20.7
Peacekeeper (M-X)	774.2[E]	359.5	263.0
*Small ICBM	NA	100.0	202.2
SRAM II	211.1	149.3	165.9
*SRAM-T	54.2	27.8	34.3
NAVY			
*AAAM	$ 68.9	$ 83.7	$ 89.3
RAM	5.1	—	—
Standard	58.6	48.5	36.8
Tomahawk	16.6	12.3	28.8
Trident II	196.3	70.4	61.6
VLA	3.0	14.8	36.9
ARMY			
AATWS-M	$131.9	$ 75.9	$ 49.5
ATACMS	36.5	—	—
Laser Hellfire	28.6[E]	30.4	17.8
LOS-F-H	54.1	90.9	97.4
*NLOS/FOG-M	99.4	72.3	—
Patriot	37.3[E]	23.7	32.9
Stinger	—	—	3.0
TOW 2	50.8[E]	25.9	80.6

Source: Department of Defense Budget, "Program Acquisition Costs by Weapon System" (Annually).
NOTE: See Missile Programs Chapter for missile program procurement authorization data.
a Total Obligational Authority.
b Navy and Air Force funding.
E Estimate. Latest year reflects Administation's budget proposal.
NA Not Available
* Programs in R&D only.

Missile Program Acronyms:
AAAM — Advanced Air-to-Air Missile
ACM — Advanced Cruise Missile
ATACMS — Army TACtical Missile System
ICBM — InterContinential Ballistic Missile
NLOS — Non-Line of Sight
SRAM — Short Range Attack Missile
TOW — Tube-launched Optically-tracked Wire command link guided missile
VLA — Vertical Launched ASROC
AATWS-M — Advanced Anti-Tank Weapon System - Medium
AMRAAM — Advanced Medium Range Air-to-Air Missile
FOG-M — Fiber Optic Guided Missile
LOS-F-H — Line Of Sight-Forward-Heavy
RAM — Rolling Airframe Missile
SRAM-T — Short Range Attack Missile - Tactical

MILITARY AIRCRAFT PROGRAMS
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION[a]

By Agency, Type, and Model
Fiscal Years 1990, 1991, and 1992
(Millions of Dollars)

Agency, Type, and Model	1990	1991[E]	1992[E]
AIR FORCE			
B-2 Advanced Tactical Bomber	$1,859.7	$1,735.0	$1,563.1
C-17	873.6	536.2	577.4
E-3 AWACS	113.3	122.1	202.1
E-8A JSTARS[b]	85.4	190.5	311.9
F-15E Eagle	75.3	66.9	119.8
F-16 Falcon	18.0	25.6	174.8
F-22 Lightning (ATF)	1,031.1	955.3	1,637.2
KC-135 Re-engining/modernization	2.2	3.5	15.0
*National Aerospace Plane	192.1	161.5	231.8
T-1A (TTTS)	3.1	2.4	4.3
NAVY			
A-12/AX	$1,538.8	$ 677.1	$ —
AH-1W Sea Cobra	17.7[E]	14.4	11.6
AV-8B Harrier	26.5	30.5	9.5
CH/MH-53E Super Stallion	5.1	19.8	9.3
E-2C Hawkeye	40.6	36.9	6.3
EA-6B Prowler	11.0	1.7	—
F-14D Tomcat	117.8	116.6	116.3
F/A-18 Hornet	33.3	76.3	435.1
V-22 Osprey	253.7	237.0	—
*Medium Lift Replacement	17.3	14.4	63.1
SH-60B Seahawk (LAMPS MK-III)	9.9	23.4	30.2
T-45TS Goshawk	26.4	14.8	6.5
ARMY			
*LONGBOW	$ 93.7	$ 193.0	$ 239.2
OH-58D AHIP	—	25.5	18.7
RAH-66 Comanche (LH)	270.7	340.4	549.5
UAVs[c]	81.3	91.6	68.6

Source: Department of Defense Budget, "Program Acquisition Costs by Weapon System" (Annually).
NOTE: See Aircraft Production Chapter for aircraft program procurement authorization data.
a Total Obligational Authority.
b Air Force and Army funding.
c Army, Navy, and Air Force funding.
E Estimate. Latest year reflects Administration's budget proposal.
* Programs in R&D only.

91-92
Foreign Trade

For the sixth consecutive year, the U.S. aerospace industry set a new record in 1990 for export volume. It was also the sixth consecutive year of rising trade surpluses and the fourth year in a row in which aerospace set a new trade balance record. Offsetting to a considerable degree U.S. trade deficits in other areas, the achievement underlined once again the importance of high value, high technology exports to the U.S. economy.

In a year in which the nation as a whole experienced a merchandise trade deficit of more than $101 billion, U.S. aerospace exports climbed to $39.1 billion, a gain of almost 22 percent above the previous record, 1989's $32.1 billion. Aerospace exports amounted to 9.9 percent of all U.S. merchandise exports in 1990.

Aerospace imports continued the steady climb in evidence since 1983 and set a seventh consecutive record at $11.8 billion, up from $10 billion in 1989. Imports, however, have increased at a lower rate (18 percent) than exports.

The record aerospace trade balance was $27.3 billion, up nearly 24 percent above the prior record ($22.1 billion in 1989).

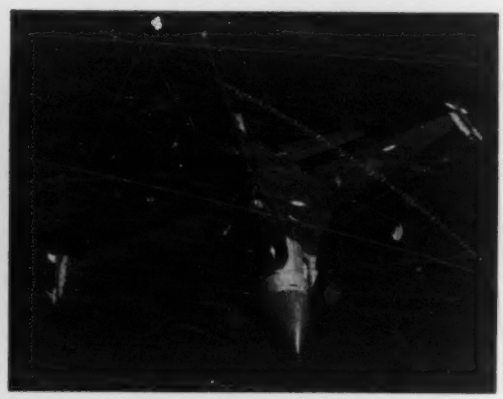
Civil products accounted for more than 80 percent of the total U.S. aerospace export volume; the 1990 figure of $31.5 billion compares with $25.6 billion in the previous year. More than half of the 1990 volume of civil exports was in deliveries of commercial transport aircraft with a total dollar value of $16.7 billion. Military exports reached an all-time high of $7.6 billion, up from $6.5 billion in 1989.

A breakdown of civil exports shows sales of complete aircraft at $18.1 billion (up from $13.4 billion in 1989); aircraft

and engine parts at $11.3 billion (up from $10 billion); and aircraft engines at $1.8 billion (down from $1.9 billion).

In addition to the $16.7 billion in commercial transport exports, civil aerospace exports consisted of $555 million in general aviation sales (up from $413 million); $712 million in used aircraft (up from $533 million); $161 million in helicopters (up from $156 million); and $360 million (up from $217 million) in a category designated "Other, including spacecraft".

The military export total of $7.6 billion included $1.8 billion in complete aircraft, $4.3 billion in aircraft and engine parts, $1.3 billion in guided missiles, rockets and parts; and $203 million in aircraft engines. The bulk of the military export gain over the previous year was in sales of complete aircraft, up $726 million over 1989 but still well below the levels of 1987-88. Exports of guided missiles, rockets, and parts rose 24 percent or $253 million.

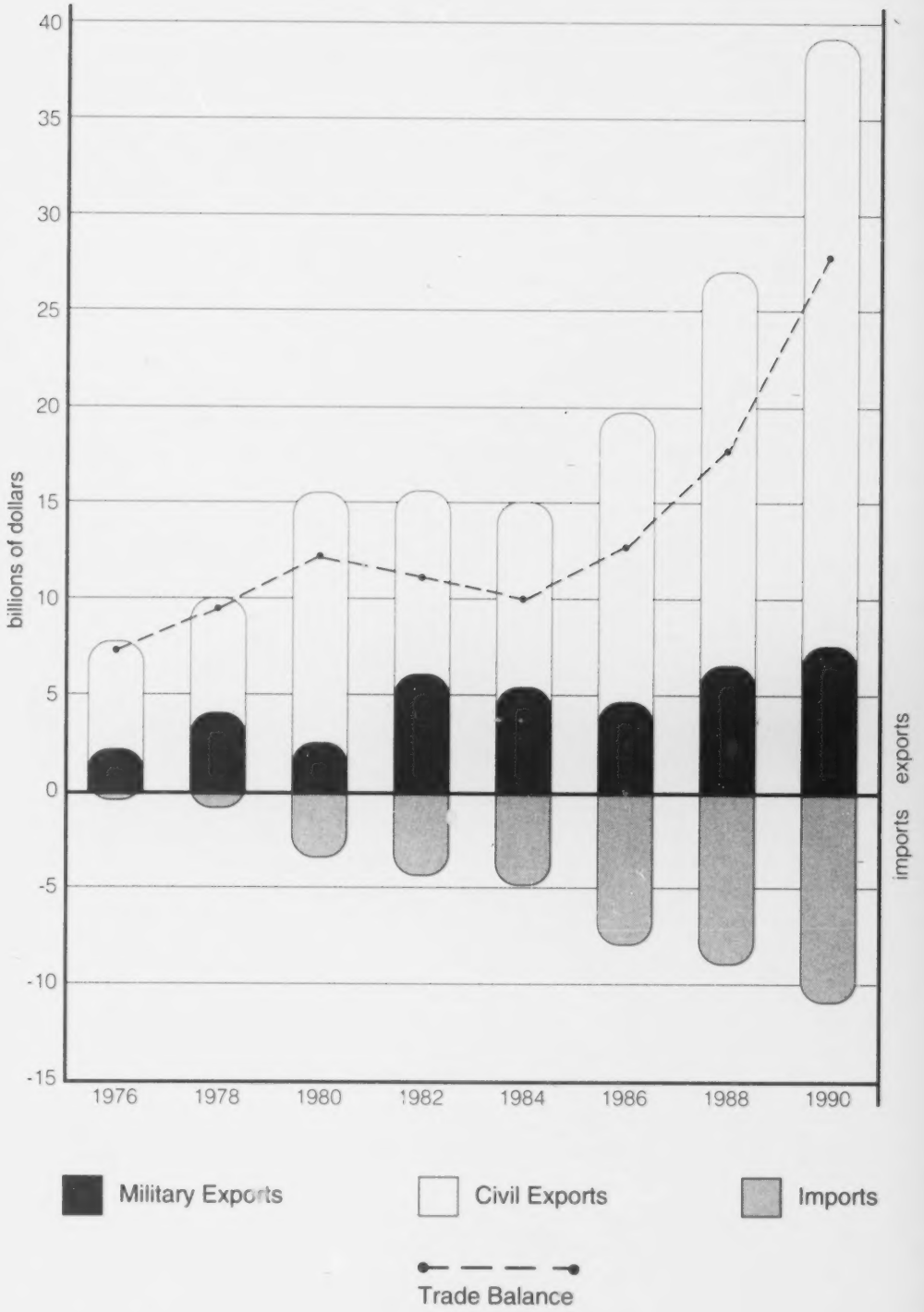


Civil products totaling $8.3 billion accounted for 70 percent of all aerospace imports. The breakdown: complete aircraft, $2.8 billion; aircraft and engine parts, $4.2 billion; aircraft engines, $1.2 billion. Military imports, up 26 percent to $3.6 billion, included $2.3 billion in aircraft and engine parts, and $1.2 billion in aircraft engines.

The principal customers for U.S. aerospace exports in 1990 were the United Kingdom, which bought products valued at $5 billion; Japan, $4.2 billion, France, $3.3 billion; Germany, $2.8 billion; Canada, $2.2 billion; and Australia, $1.8 billion. Other major customers included The Netherlands, $1.6 billion; Spain, $1.2 billion; and South Korea, $1.1 billion.

Three countries accounted for more than two-thirds of all aerospace imports into the U.S.: France, $2.8 billion; the United Kingdom, $2.7 billion; and Canada, $2.5 billion.

Aerospace Exports, Imports, and Trade Balance



Source: Aerospace Industries Association

U.S. TOTAL AND AEROSPACE FOREIGN TRADE[a]

Calendar Years 1964 - 1990
(Millions of Dollars)

Year	Total U.S. Merchandise Trade			Aerospace		
	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports
1964	$ 7,006	$ 25,690	$ 18,684	$ 1,518	$ 1,608	$ 90
1965	5,334	26,699	21,366	1,459	1,618	159
1966	3,837	29,379	25,542	1,370	1,673	303
1967	4,122	30,934	26,812	1,961	2,248	287
1968	837	34,063	33,226	2,661	2,994	333
1969	1,289	37,332	36,043	2,831	3,138	307
1970	3,225	43,176	39,952	3,097	3,405	308
1971	(1,476)[b]	44,087	45,563	3,830	4,203	373
1972	(5,729)	49,854	55,583	3,230	3,795	565
1973	2,390	71,865	69,476	4,360	5,142	782
1974	(3,884)	99,437	103,321	6,350	7,095	745
1975	9,551	108,856	99,305	7,045	7,792	747
1976	(7,820)	116,794	124,614	7,267	7,843	576
1977	(28,353)	123,182	151,534	6,850	7,581	731
1978	(30,205)	145,847	176,052	9,058	10,001	943
1979	(23,922)	186,363	210,285	10,123	11,747	1,624
1980	(19,696)	225,566	245,262	11,952	15,506	3,554
1981	(22,267)	238,715	260,982	13,134	17,634	4,500
1982	(27,510)	216,442	243,952	11,035	15,603	4,568
1983	(52,409)	205,639	258,048	12,619	16,065	3,446
1984	(106,703)	223,976	330,678	10,082	15,008	4,926
1985	(117,712)	218,815	336,526	12,593	18,725	6,132
1986	(138,279)	227,159	365,438	12,826	19,728	7,902
1987	(152,119)	254,122	406,241	14,575	22,480	7,905
1988	(118,526)	322,426	440,952	17,860	26,947	9,087
1989	(109,399)	363,812	473,211	22,083	32,111	10,028
1990	(101,010)	393,893	494,903	27,282	39,083	11,801

Source: Bureau of the Census, Foreign Trade Division and Aerospace Industries Association, based on data from International Trade Administration.

NOTE: The Commerce Department began reporting international trade using the Harmonized Tariff Schedules of the United States in 1989. Previous years based on the Tariff Schedules of the United States Annotated.

a Total U.S. and aerospace foreign trade are reported as (1) exports of domestic merchandise, including Department of Defense shipments and undocumented exports to Canada, f.a.s. (= free alongside ship) basis, (2) imports for consumption, customs value basis.

b First U.S. trade deficit since 1888.

U.S. EXPORTS OF AEROSPACE PRODUCTS[a] BY MAJOR COUNTRIES OF DESTINATION

Calendar Years 1986 - 1990
(Millions of Dollars)

Major Countries of Destination	1986	1987	1988	1989	1990
Australia	$1,327	$1,036	$1,208	$1,271	$1,760
Belgium/Luxembourg	345	373	348	538	681
Brazil	451	912	942	813	925
Canada	1,005	1,103	1,804	2,137	2,237
China	334	528	425	664	861
France	1,480	1,382	2,074	2,764	3,299
Germany, West	1,282	1,274	1,415	3,134	2,798
Hong Kong	266	351	166	381	587
Israel	304	487	454	453	503
Italy	533	455	578	625	737
Japan	2,209	2,313	2,710	2,700	4,185
Korea, South	301	343	823	1,257	1,113
Netherlands	625	565	744	1,448	1,613
Saudi Arabia	670	221	235	266	200
Singapore	529	498	505	1,133	844
Spain	204	447	691	1,104	1,198
Sweden	419	307	627	815	952
Switzerland	258	334	294	458	283
Taiwan	238	153	164	460	732
United Kingdom	1,301	2,297	2,908	3,520	4,966

Source: U.S. Department of Commerce, International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Includes all civil products, free alongside ship basis; excludes military products whose country of destination are not reported.

U.S. IMPORTS OF AEROSPACE PRODUCTS[a] BY MAJOR COUNTRIES OF ORIGIN

Calendar Years 1986 - 1990
(Millions of Dollars)

Major Countries of Origin	1986	1987	1988	1989	1990
Brazil	$ 84	$ 122	$ 183	$ 204	$ 360
Canada	1,905	1,821	1,985	1,922	2,531
France	2,007	1,976	2,932	3,290	2,783
Germany, West	315	347	396	419	713
Israel	211	208	178	187	227
Italy	221	266	339	300	418
Japan	272	319	426	474	567
Netherlands	275	127	141	255	368
Sweden	244	278	246	305	317
United Kingdom	1,898	2,004	1,738	2,057	2,702

Source: U.S. Department of Commerce, International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Includes civil and military products, c.i.f. (Cost, Insurance, and Freight) basis.

U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1986 - 1990
(Millions of Dollars)

Aerospace Imports	1986	1987	1988	1989	1990
TOTAL	$7,902	$7,905	$9,087	$10,028	$11,801
TOTAL CIVIL	$6,398	$6,409	$7,604	$ 7,200	$ 8,251
Complete Aircraft—TOTAL	$2,050	$2,038	$2,702	$ 2,788	$ 2,794
Transports	742	551	1,125	1,282	737
General Aviation	1,053	1,337	1,369	1,113[r]	1,581
Helicopters	63	79	104	109	162
Other, Including Used Aircraft & Gliders, Balloons, & Airships	192	70	103	285[ar]	314[a]
Aircraft Engines—TOTAL	1,133	1,117	951	999	1,234
Turbine Engines	1,114	1,110	951	961[b]	1,204[b]
Piston Engines	19	7	-	38	31
Aircraft & Engine Parts—TOTAL	3,215	3,254	3,951	3,414	4,222
Aircraft Parts and Accessories	594	659	2,585	2,305[b]	2,751[b]
Turbine Engine Parts	1,053	1,058	1,323	924[b]	1,147[b]
Piston Engine Parts	12	19	14	136	57
Spacecraft, Other Parts & Accessories[c]	1,556	1,519	29	50	267
TOTAL MILITARY	$1,504	$1,496	$1,483	$ 2,828	$ 3,550
Complete Aircraft—TOTAL	$ 35	$ 33	$ 2	$ 17	$ 44
Aircraft Engines—TOTAL	286	199	106	971	1,217
Turbine Engines	283	196	101	961[b]	1,204[b]
Piston Engines Including Parts	3	3	5	10	13
Aircraft & Engine Parts—TOTAL	1,183	1,265	1,376	1,841	2,290
Aircraft Parts	690	699	869	797[b]	858[b]
Turbine Engine Parts	317	370	480	881[b]	1,088[b]
Spacecraft, Missiles, Rockets, Other Parts, & Accessories[c]	176	196	27	162[b]	343[b]

Source: Aerospace Industries Association, based on data from International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, these products have been predominantly civil.
b Category contains products whose use (civil or military) is unspecified by the Harmonized Tariff Schedules. Figures for those products distributed equally between civil and military.
c Includes satellites, propulsion engines, and parachutes.
r Revised.

U.S. IMPORTS OF COMPLETE AIRCRAFT

Calendar Years 1986 - 1990

Aircraft Imports	1986	1987	1988	1989	1990
TOTAL NUMBER OF AIRCRAFT	797	816	737	703	848
Civil Aircraft—TOTAL	742	630	706	674	820
New Complete Aircraft:					
Helicopters	87	98	114	124	167
General Aviation:					
Single-Engine	71	41	40	53[r]	80
Multi-Engine, Under 4,400 lbs	18	1	3	1	5
Multi-Engine, 4,400-10,000 lbs	58	81	74	32[r]	53
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs	63	76	74	39	63
Multi-Engine, Other, Including Turboshaft, 10,000-33,000 lbs	87	79	78	87	100
Transports, Multi-Engine, Over 33,000 lbs	36	22	18	36	30
Other Civil Aircraft:					
Used or Rebuilt	141	115	194	210	130
Aircraft Previously Exported from U.S.	NA	NA	NA	NA	NA
Gliders	181	117	111	76[a]	184[a]
Balloons & Airships	NA	NA	NA	15[a]	8[a]
Military Aircraft—TOTAL	55	186	31	29[b]	28
New Complete Aircraft	47	123	27	25	28
Gliders	8	63	4	(a)	(a)
Balloons & Airships	NA	NA	NA	(a)	(a)

(Continued on next page)

U.S. IMPORTS OF COMPLETE AIRCRAFT

(Continued)

Aircraft Imports	1986	1987	1988	1989	1990
VALUE (Millions of Dollars)	$2,084.5	$2,070.4	$2,703.3	$2,804.5	$2,838.3
Civil Aircraft—TOTAL	$2,049.6	$2,037.7	$2,701.5	$2,788.1	$2,794.2
New Complete Aircraft:					
Helicopters	62.6	79.3	103.9	108.7	162.4
General Aviation:					
Single-Engine	8.1	3.1	4.5	6.7r	9.0
Multi-Engine, Under 4,400 lbs	1.5	0.3	6.5	0.1	1.3
Multi-Engine, 4,400-10,000 lbs	134.9	206.7	163.6	119.1r	217.3
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs	433.5	677.3	729.1	372.0	643.6
Multi-Engine, Other, Including Turboshaft, 10,000-33,000 lbs	475.5	449.8	465.3	614.9	709.9
Transports, Multi-Engine, Over 33,000 lbs	741.8	551.1	1,125.4	1,281.8	737.0
Other Civil Aircraft:					
Used or Rebuilt	189.0	60.7	92.0	236.7	292.4
Aircraft Previously Exported from U.S.	—	8.0	0.1	48.8	0.4
Gliders	1.7	0.6	0.5	0.3[a]	0.8[a]
Balloons & Airships	0.9	0.9	10.8	0.5[a]	2.3[a]
Military Aircraft—TOTAL	$ 34.9	$ 32.7	$ 1.8	$ 16.5[b]	$ 44.2
New Aircraft	34.0	29.8	1.6	16.4	44.2
Gliders	0.8	1.3	0.1	(a)	(a)
Balloons & Airships	0.1	1.6	0.1	(a)	(a)

Source: Aerospace Industries Association, based on data from International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, these products have been predominantly civil.
b Includes used aircraft.
NA Not available.
r Revised.

TOTAL U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1964 - 1990
(Millions of Dollars)

Year	TOTAL Exports of U.S. Merchandise[a]	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Total	Trans-ports	
1964	$ 25,690	$ 1,608	6.3%	$ 764	$ 211	$ 844
1965	26,699	1,618	6.1	854	353	764
1966	29,379	1,673	5.7	1,035	421	638
1967	30,934	2,248	7.3	1,380	611	868
1968	34,063	2,994	8.8	2,289	1,200	705
1969	37,332	3,138	8.4	2,027	947	1,111
1970	43,176	3,405	7.9	2,516	1,283	889
1971	44,087	4,203	9.5	3,080	1,567	1,123
1972	49,854	3,795	7.6	2,954	1,119	841
1973	71,865	5,142	7.2	3,788	1,664	1,354
1974	99,437	7,095	7.1	5,273	2,655	1,822
1975	108,856	7,792	7.2	5,324	2,397	2,468
1976	116,794	7,843	6.7	5,677	2,468	2,166
1977	123,182	7,581	6.2	5,049	1,936	2,532
1978	145,847	10,001	6.9	6,018	2,558	3,983
1979	186,363	11,747	6.3	9,772	4,998	1,975
1980	225,566	15,506	6.9	13,248	6,727	2,258
1981	238,715	17,634	7.4	13,312	7,180	4,322
1982	216,442	15,603	7.2	9,608	3,834	5,995
1983	205,639	16,065	7.8	10,595	4,683	5,470
1984	223,976	15,008	6.7	9,659	3,195	5,350
1985	218,815	18,725	8.6	12,942	5,518	5,783
1986	227,159	19,728	8.7	14,851	6,276	4,875
1987	254,122	22,480	8.8	15,768	6,377	6,714[r]
1988	322,426	26,947	8.4	20,298	8,766	6,651[r]
1989	363,812	32,111	8.8	25,619	12,313	6,492
1990	393,893	39,083	9.9	31,517	16,691	7,566

Source: Bureau of the Census, Foreign Trade Division and Aerospace Industries Association, based on data from International Trade Administration.

NOTE: International trade reported using Harmonized Tariff Schedules after 1988.

a Includes DOD shipments and undocumented exports to Canada, free alongside ship basis.

r Revised.

U.S. EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1986 - 1990
(Millions of Dollars)

Aerospace Exports	1986	1987	1988	1989	1990
TOTAL	$19,728	$22,480	$26,947	$32,111	$39,083
TOTAL CIVIL	$14,851	$15,765[r]	$20,297[r]	$25,619	$31,517
Complete Aircraft—TOTAL	$ 7,365	$ 7,517[r]	$10,294[r]	$13,447	$18,150
Transports	6,276	6,377	8,766	12,313	16,691
General Aviation[a]	243	295	348	413	555
Helicopters	277	201	219	156	161
Used Aircraft	501	503	639	533	712
Other, Incl. Spacecraft	68	141	323	217[br]	360[b]
Aircraft Engines—TOTAL	987	1,206[r]	1,570	1,948	1,754
Turbine Engines	944	1,154	1,492	1,856	1,679
Piston Engines	43	53	78	93	75
Aircraft and Engine Parts Incl. Spares—TOTAL	6,499	7,042[r]	8,432	10,019	11,257
Aircraft Parts & Accessories	4,412	4,650	5,442	6,258	6,964
Aircraft Engine Parts	2,087	2,393	2,990	3,761	4,293
TOTAL MILITARY	$ 4,875	$ 6,714[r]	$ 6,651[r]	$ 6,492	$ 7,566
Complete Aircraft—TOTAL[c]	$ 1,502	$ 2,628	$ 2,157	$ 892	$ 1,481
Fighters & Fighter Bombers	1,016	1,986	1,469	368	533
Transports	156	363	212	234	432
Helicopters	123	81	198	180	381
Used Aircraft	7	4	59	56	75
Other, Incl. Spacecraft	200	194	219	247[b]	391[b]
Aircraft Engines—TOTAL	111	157[r]	223	236	203
Turbine Engines	108	154	213	198	168
Piston Engines	3	4	10	38	35
Aircraft and Engine Parts Incl. Spares—TOTAL	2,604	3,085	3,214	4,134	4,261
Aircraft Parts & Accessories	2,129	2,457	2,546	3,450	3,640
Aircraft Engine Parts	475	628	668	684	622
Guided Missiles, Rockets, & Parts—TOTAL	658	845	1,056	1,037	1,290
Guided Missiles & Rockets	303	353	383	375	551
Missile & Rocket Parts	322	456	622	656	724
Missile & Rocket Engines	17	21	30	6	15
Missile & Rocket Engine Parts	16	15	21	—	—

Source: Aerospace Industries Association, based on data from International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a All fixed-wing aircraft under 33,000 pounds.
b Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, aircraft herein have been predominantly civil. Also, spacecraft not included in "Complete Aircraft—Total."
c Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.
r Revised.

U.S. EXPORTS OF CIVIL AIRCRAFT

Calendar Years 1986 - 1990

Civil Aircraft Exports	1986	1987	1988	1989	1990
TOTAL NUMBER OF AIRCRAFT	1,327	1,811	2,784	3,564[br]	3,375[b]
Helicopters—TOTAL	210	242	280	294	349
Under 2,200 lbs	104	115	161	186	266
Over 2,200 lbs	106	127	119	108	83
General Aviation—TOTAL	464	487	643	1,310[r]	809
Single-Engine	270	295	459	1,119[r]	561
Multi-Engine, Under 4,400 lbs	63	51	51	39	33
Multi-Engine, 4,400-10,000 lbs	93	126	109	104	136
Multi-Engine, 10,000-33,000 lbs	36	15	24	48	79
Transports—TOTAL	159	170	217	260	306
Passenger Aircraft, Over 33,000 lbs	149	160	205	256	294
Cargo Aircraft, Over 33,000 lbs	2	4	8	1	3
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi	8	6	4	3	9
Other Aircraft—TOTAL	494	912	1,644	1,700[b]	1,911[b]
Used or Rebuilt Aircraft	494	912	1,644	1,700	1,911
Other Aircraft, Including Balloons, Gliders, & Kites	NA	NA	NA	2,888[r]	1,448
TOTAL VALUE (Millions of Dollars)	$7,365	$7,518	$10,296	$13,447	$18,150
Helicopters—TOTAL	$ 277	$ 201	$ 219	$ 156	$ 161
Under 2,200 lbs	29	27	30	29	39
Over 2,200 lbs	248	174	189	127	123
General Aviation—TOTAL	243	295	348	413[r]	555
Single-Engine	28	26	47	56[r]	44
Multi-Engine, Under 4,400 lbs	13	8	12	9	10
Multi-Engine, 4,400-10,000 lbs	133	219	239	184	256
Multi-Engine, 10,000-33,000 lbs	69	42	49	164	245
Transports—TOTAL	6,276	6,377	8,766	12,313	16,691
Passenger Aircraft, Over 33,000 lbs	5,352	5,635	7,770	11,859	15,307
Cargo Aircraft, Over 33,000 lbs	186	208	599	90	264
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi	738	534	396	364	1,121
Other Aircraft—TOTAL	569	645	963	560	742
Used or Rebuilt Aircraft	501	503	639	533	712
Other Aircraft, Including Balloons, Gliders, & Kites[a]	68	141	323	33[r]	30

Source: Aerospace Industries Association, based on data from International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Included spacecraft until 1989.
b Numbers of gliders, balloons, & kites excluded from civil aircraft totals.
NA Not available. *r* Revised.

U.S. EXPORTS OF CIVIL HELICOPTERS[a]

Calendar Years 1986 - 1990

Region of Destination	1986	1987	1988	1989	1990
TOTAL NUMBER EXPORTED ...	210	242	280	294	349
Canada & Greenland	12	13	17	11	11
Latin America & Caribbean	39	42	25	54	46
Europe	45	97	131	170	140
Middle East	26	10	15	6	1
Asia	54	46	52	51	65
Oceania	19	27	31	33	68
Africa	15	7	9	9	18
TOTAL VALUE (Millions of Dollars)	$277.3	$200.5	$218.6	$155.5	$161.2
Canada & Greenland	$ 3.2	$ 4.9	$ 5.2	$ 2.6	$ 5.1
Latin America & Caribbean	24.4	47.8	24.5	39.7	20.1
Europe	25.6	37.7	36.0	37.1	46.8
Middle East	78.7	53.1	70.6	5.4	3.6
Asia	125.7	47.0	68.1	60.0	71.3
Oceania	7.8	6.1	10.3	9.2	8.7
Africa	11.9	4.0	3.9	1.6	5.6

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Excludes used helicopters.

U.S. IMPORTS OF CIVIL HELICOPTERS[a]

Calendar Years 1986 - 1990

Country of Origin	1986	1987	1988	1989	1990
TOTAL NUMBER IMPORTED ...	87	98	114	124	167
Canada	—	32	33	52	82
France	21	29	30	45	49
Germany	55	33	45	25	25
Italy	8	4	7	2	11
United Kingdom	3	—	1	—	—
TOTAL VALUE (Millions of Dollars)	$62.6	$79.3	$103.9	$108.7	$162.4
Canada	$ —	$18.9	$ 21.5	$ 44.5	$ 86.3
France	10.8	24.0	21.6	32.0	29.9
Germany	43.9	31.2	50.1	28.9	34.9
Italy	5.7	5.2	10.5	3.3	11.3
United Kingdom	2.2	—	0.2	—	—

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Excludes used helicopters.

U.S. EXPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1986 - 1990

Region of Destination	1986	1987	1988	1989r	1990
TOTAL NUMBER EXPORTED	464	487	643	1,310	809
Canada & Greenland	50	25	14	35	34
Latin America & Caribbean	166	93	100	155	133
Europe	146	213	322	634	379
Middle East	8	27	2	7	15
Asia	42	67	50	154	55
Oceania	33	33	125	164	72
Africa	19	29	30	161	121
TOTAL VALUE (Millions of Dollars)	$243.1	$295.1	$347.7	$413.1	$554.9
Canada & Greenland	$ 10.5	$ 12.0	$ 12.8	$ 11.7	$ 41.7
Latin America & Caribbean	48.6	51.4	114.0	120.4	152.8
Europe	92.6	148.6	126.7	168.0	197.1
Middle East	6.8	1.6	0.1	4.7	18.1
Asia	48.8	49.8	38.7	43.0	47.9
Oceania	16.7	3.4	35.8	18.0	22.0
Africa	19.0	28.4	19.6	47.4	75.3

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a All fixed-wing aircraft under 33,000 pounds.
r Revised.

U.S. IMPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1986 - 1990

Country of Origin	1986	1987	1988	1989r	1990
TOTAL NUMBER IMPORTED	297	278	269	212	301
Brazil	13	20	30	30	51
Canada	34	34	40	31	32
France	99	76	60	65	93
Israel	13	8	5	8	12
Japan	10	12	29	—	—
Netherlands	10	—	—	—	—
United Kingdom	79	80	64	19	77
Other	39	48	41	38	36
TOTAL VALUE (Millions of Dollars)	$1,053.5	$1,337.0	$1,369.0	$1,112.8	$1,581.2
Brazil	$ 62.8	$ 97.8	$ 163.8	$ 175.6	$ 306.9
Canada	229.8	209.6	268.6	275.2	354.7
France	196.1	510.5	532.7	335.0	336.2
Israel	54.8	30.7	24.6	41.5	70.6
Japan	8.6	12.6	23.9	—	—
Netherlands	56.9	—	—	—	—
United Kingdom	297.7	301.9	271.7	212.7	414.6
Other	146.6	173.9	83.7	72.8	98.1

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a All fixed-wing aircraft under 33,000 pounds.
r Revised.

U.S. EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT[a]

Calendar Years 1986 - 1990

Region of Destination	1986	1987	1988	1989	1990
TOTAL NUMBER EXPORTED	159	170	217	260	306
Canada & Greenland	2	—	10	9	4
Latin America & Caribbean	9	20	15	28	25
Europe	69	88	127	151	172
Middle East	11	7	4	8	9
Asia	35	40	41	47	70
Oceania	30	8	11	8	16
Africa	3	7	9	9	10
TOTAL VALUE (Millions of Dollars)	$6,276	$6,377	$8,766	$12,313	$16,691
Canada & Greenland	$ 46	$ —	$ 547	$ 535	$ 309
Latin America & Caribbean	343	725	669	726	1,001
Europe	2,284	2,753	3,944	6,335	8,166
Middle East	613	185	227	631	440
Asia	1,957	2,263	2,404	2,951	5,010
Oceania	927	289	503	640	1,256
Africa	104	162	471	496	509

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Airframe weight exceeding 33,000 pounds.

U.S. EXPORTS OF MILITARY AIRCRAFT[a]

Calendar Years 1986 - 1990

	1986	1987	1988	1989	1990
TOTAL NUMBER OF AIRCRAFT	405	492	743	846	445
Fighters and Fighter Bombers	68	122	87	32	39
Transports	11	99	14	74	43
Helicopters	45	39	53	36	47
New Aircraft, NEC[b]	271	218	464	505	259
Used or Rebuilt Aircraft	10	14	125	199	57
Airships, Balloons, Gliders, etc.	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$1,502	$2,628	$2,157	$892	$1,481
Fighters and Fighter Bombers	$1,016	$1,986	$1,469	$368	$ 533
Transports	156	363	212	234	432
Helicopters	123	81	198	180	381
New Aircraft, NEC[b]	178	135	173	53	61
Used or Rebuilt Aircraft	7	4	59	56	75
Airships, Balloons, Gliders, etc.	22	59	46	—[c]	—[c]

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.
b Includes spacecraft until 1989.
c Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, these products have been predominantly civil.
NA Not available.
NEC Not elsewhere classified.

U.S. EXPORTS OF AIRCRAFT ENGINES

Calendar Years 1988 - 1990
(Values in Millions of Dollars)

	1988		1989		1990	
	Number	Value	Number	Value	Number	Value
TOTAL	8,746	$1,792	12,570	$2,184	9,419	$1,957
Turbine Engines—New	1,289	$1,093	3,917	$2,053	3,008	$1,846
Civil	1,111	899	3,031	1,856	2,277	1,679
Military	178	194	886	198	731	168
Turbine Engines—Used	1,197	612	(a)	(a)	(a)	(a)
Civil	1,120	593	(a)	(a)	(a)	(a)
Military	77	19	(a)	(a)	(a)	(a)
Piston Engines	6,260	87	8,653	131	6,411	110
Civil, New, Under 500 HP	1,543	17	1,964	19	1,108	15
Civil, New, Over 500 HP	1,072	22	423	13	256	10
Civil, Used	2,976	38	4,036	70	3,183	50
Military	669	10	2,230	38	1,864	35

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a The Harmonized Tariff Schedule combines new and used turbine engines into a single category.

U.S. IMPORTS OF AIRCRAFT ENGINES[a]

Calendar Years 1988 - 1990
(Values in Millions of Dollars)

	1988		1989		1990	
	Number	Value	Number	Value	Number	Value
Turbine Engines	2,823	$1,051	2,283	$1,921	5,007	$2,408
Civil	2,514	951	(b)	(b)	(b)	(b)
Military	309	100	(b)	(b)	(b)	(b)

Source: Aerospace Industries Association, based on data from the International Trade Administration.
NOTE: International trade reported using Harmonized Tariff Schedules after 1988.
a New and used.
b The Harmonized Tariff Schedule combines military and civil turbine engines into a single category.

EXPORT-IMPORT BANK LENDING AUTHORITY AND GROSS AUTHORIZATIONS SUMMARY

Fiscal Years 1981 - 1991
(Millions of Dollars)

LOANS

Year	Authority Lending	Authorizations Summary		
		Direct Loans[a]		
		TOTAL	Direct Credits	Other[b]
1981	$ 5,461	$5,431	$5,079[c]	$ 352
1982	4,400	3,516	3,104	412
1983	4,400	845	685	160
1984	3,865	1,465	1,122	343
1985	3,865	659	320	339
1986	1,059	578	371	207
1987	680	599	332	267
1988	693	685	465	220
1989	719	719	517	202
1990	614	614	318	296
1991[E]	736	NA	NA	NA

GUARANTEES AND INSURANCE

Year	Authority Lending	Authorizations Summary		
		Direct Loans[a]		
		TOTAL	Guarantees	Insurance
1981	$ 8,059	$7,416	$1,506	$5,910
1982	9,220	5,832	727	5,105
1983	9,000	8,525	1,741	6,784
1984	10,000	7,151	1,333	5,818
1985	10,000	7,850	1,320	6,530
1986	11,484[d]	5,508	1,128	4,380
1987	11,355	7,958	1,514	6,444
1988	13,406	5,735	601	5,134
1989	17,901	5,637	1,292	4,345
1990	10,191	8,174	3,333	4,841
1991[E]	10,398	NA	NA	NA

Source: Export-Import Bank of the United States.

a The value of Direct Loans may exceed Lending Authority because of the inclusion in Direct Loans of the full amount of Certificates of Loan, portions of which are subsequently sold to commercial banks.

b Includes discount loans, medium term, and small business credits.

c Includes $34 million from the Cooperative Financing Facility program discontinued after 1981.

d Includes $1,800 million proposed I-MATCH Program, which would replace direct lending and would allow an estimated $100 million in commercial loan interest buy-down.

E Estimate. Latest year represents Administration's budget proposal.

NA Not available.

EXPORT-IMPORT BANK
TOTAL AUTHORIZATIONS OF LOANS AND GUARANTEES AND AUTHORIZATIONS IN SUPPORT OF AIRCRAFT EXPORTS

Fiscal Years 1979 - 1990
(Millions of Dollars)

Year	TOTAL AUTHORIZATIONS	Authorizations in Support of Aircraft Exports			
		TOTAL	Percent of TOTAL Authorizations	Commercial Jet Aircraft[a]	Other Aircraft[b]
LOANS[c]					
1979	$4,475	$1,469.4	32.8%	$1,399.4	$ 70.0
1980	4,578	1,743.3	38.1	1,692.6	50.7
1981	5,431	2,576.6	47.4	2,550.3	26.3
1982	3,516	263.9	7.5	199.1	64.8
1983	845	396.7	46.9	383.8	12.9
1984	1,465	608.0	41.5	531.8	76.2
1985	659	39.7	6.0	12.6	27.1
1986	578	54.6	9.4	46.4	8.2
1987	599	17.0	2.8	13.3	3.7
1988	685	—	—	—	—
1989	695	166.4	23.9	158.0	8.4
1990	614	5.0	0.8	—	5.0
GUARANTEES[d]					
1979	$ 908	$ 261.4	28.8%	$ 239.3	$ 22.1
1980	2,510	1,131.9	45.1	1,088.1	43.8
1981	1,506	562.6	37.4	533.4	29.2
1982	727	104.2	14.3	78.4	25.8
1983	1,741	629.6	36.2	601.3	28.3
1984	1,333	355.5	26.7	293.5	62.0
1985	1,320	322.4	24.4	288.9	33.5
1986	1,128	329.2	29.2	277.4	51.8
1987	1,506	808.3	53.4	808.3	—
1988	601	89.2	14.8	73.4	15.8
1989	1,293	496.4	38.4	390.4	106.0
1990	3,333	1,666.3	50.0	224.7	1,441.6

Source: Export-Import Bank of the United States.

a Includes complete aircraft, engines, parts, and retrofits.

b Includes business aircraft, general aviation aircraft, helicopters, and related goods and services.

c Loans are commitments for financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits, loans authorized under the Cooperative Financing Facilty (CFF), (until the termination of the CFF program in 1981), and Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is also included with Guarantees.

d Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions. Excludes insurance.

EXPORT-IMPORT BANK
SUMMARY OF COMMERCIAL JET AIRCRAFT AUTHORIZATIONS FOR LOANS[a] AND GUARANTEES[b]

Fiscal Years 1957 - 1990
(Values in Millions of Dollars)

Year	No. of Jet Aircraft[c]		Export Value[c]		No. of New Commitments		Gross Authorizations	
	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees
New Authorizations:								
1957[d]-1972	790	88	$ 7,645	$ 590	261	192	$ 3,271	$1,010
1973	129	4	1,729	25	60	23	690	191
1974	189	—	2,195	—	79	22	895	133
1975	136	1	2,070	5	64	10	691	64
1976	77	6	1,017	139	34	11	398	87
Tr.Qtr.	15	5	219	182	6	3	94	59
1977	31	25	330	902	16	14	138	294
1978	29	5	479	253	18	5	189	77
1979	118	7	2,938	317	35	10	1,399	239
1980	136	21	3,975	901	36	24	1,693	1,088
1981	121	18	4,568	637	26	17	2,550	533
1982	11	6	441	113	5	2	199	78
1983	21	9	779	619	3	4	384	601
1984	37	8	1,023	327	7	4	532	294
1985	—	14	19	481	1	5	13	289
1986	3	13	74	451	1	9	46	277
1987	—	27	22	1,449	1	14	13	808
1988	—	2	—	97	—	2	—	73
1989	3	5	253	459	1	2	158	390
1990	—	6	—	264	—	2	—	225
Cumulative New Authorizations	1,846	270	$29,776	$8,210	654	375	$13,353	$6,810
Transfers, Reversals, & Participation	—	—	(8)	8	4	—	(140)	(20)
Cumulative Gross Authorizations (net of Adjustments)	1,846	270	$29,767	$8,218	658	375	$13,213	$6,791

Source: Export-Import Bank of the United States.

a Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF) until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank in which case the value of the loans is included with Guarantees.

b Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

c For Export-Import Bank commitments including both loan and guarantee authorization, number of aircraft and export value reported under "Loans."

d First year of commercial jet aircraft authorizations.

Tr.Qtr. See Glossary.

EXPORT-IMPORT BANK
AUTHORIZATIONS OF LOANS AND GUARANTEES
IN SUPPORT OF EXPORTS OF COMMERCIAL JET AIRCRAFT

Fiscal Years 1986 - 1990
(Values in Millions of Dollars)

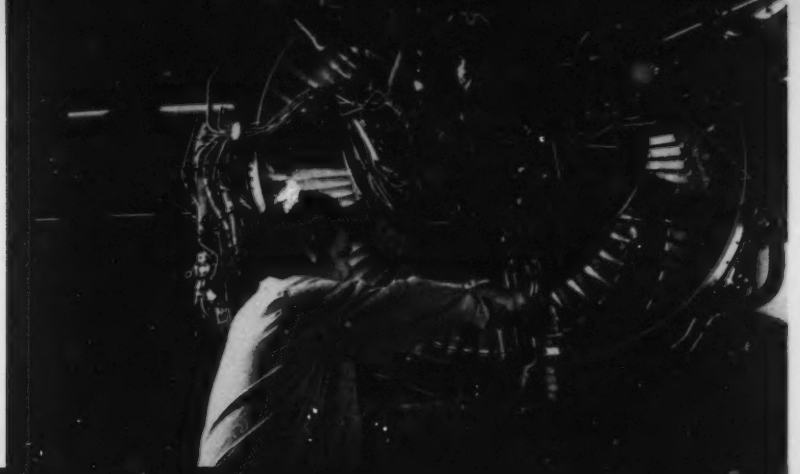
Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorization				
			Loans (Direct Credits)				Guarantees
			Amount	Percent Coverage[a]	Interest Rate	Repayment Terms[b]	Amount
FY 1990							
TOTALS	6 aircraft	$ 264	—	—	—	—	$225
Columbia/Avianca	2 x 767	150	—	—	—	—	128
Morocco/Royal Air Maroc	4 x 737	114	—	—	—	—	97
FY 1989							
TOTALS	8 aircraft	$ 712	$293	—	—	—	$605
Algeria/Algerie Air	3 x 737	253	158	62.5	8.95%	24-S	215
Yugoslavia/Jugoslovenski Aerotransport	3 x MD-11	301	—	—	—	—	255
Zimbabwe/Government of	2 x 747	159	135	85.0	9.68%	24-S	135
FY 1988							
TOTALS	2 aircraft	$ 94	—	—	—	—	$ 76
Bangladesh/Bangladesh Biman Corp.	1 x DC-10-30	67	—	—	—	—	50
Israel/El Al	1 x 757	27	—	—	—	—	22
Uganda/Uganda Airlines	707 Hushkit	3	—	—	—	—	3
FY 1987							
TOTALS	32 aircraft	$1,411	$ 7	—	—	—	$768
Brazil/VARIG	6 x 767	324	—	—	—	—	275
Israel/El Al	2 x 757	59	—	—	—	—	50
Japan/All Nippon	15 x 767	857	—	—	—	—	300
Mauritius/Air Mauritius	2 x 767	5	—	—	—	—	5
Mauritius/ Air Mauritius	spare parts for 2 x 767	16	7	42.5	9.10%	20-S	7

(Continued on next page)

EXPORT-IMPORT BANK
LOAN AND GUARANTEE AUTHORIZATIONS
(Continued)

Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorization				
			Loans (Direct Credits)				Guarantees
			Amount	Percent Coverage[a]	Interest Rate	Repayment Terms[b]	Amount
FY 1987 (continued)							
Nepal/Royal Nepal Airlines	2 x 757	$ 76	$ —	—	—	—	$ 64
Yugoslavia/Jugoslovenski Aerotransport	2 x 737	53	—	—	—	—	45
Yugoslavia/Aviogenex	2 x 737	18	—	—	—	—	14
Yugoslavia/Aviogenex	1 x 737	19	—	—	—	—	15
FY 1986							
TOTALS	16 aircraft	$525.5	$46.3	—	—	—	$277.4
Brazil/Ministry of Aeronautics	tools for engine overhaul	6.9	—	—	—	—	5.9
Chile/Lan-Chile, S.A.	2 x 767	96.2	—	—	—	—	40.0
Finland/Finnair	3 x MD-87	74.2	46.3	62.5	8.4%	20-S	—
Gabon/Air Gabon	1 x 100-30	22.7	—	—	—	—	19.3
Jamaica/Air Jamaica	engines	4.3	—	—	—	—	3.6
Yugoslavia/Inex Adria Airways	engines	2.2	—	—	—	—	1.9
Yugoslavia/Jugoslovenski Aerotransport	2 x 737	69.9	—	—	—	—	59.4
Yugoslavia/Jugoslovenski Aerotransport	1 x MD-82	21.8	—	—	—	—	18.6
Zimbabwe/Government of	3 x 737	66.2	—	—	—	—	56.2
Japan/All Nippon Airways	4 x 767	161.1	—	—	—	—	72.5

Source: Aerospace Industries Assocation, based on data from the Export-Import Bank of the United States.
NOTE: For definitions of Loans and Guarantees, see Export-Import Bank tables on previous pages.
a Amount of loan as percent of export value.
b Number of payments and frequency (S = semi-annual).



91-92
Employment

The aerospace industry's labor force suffered a net loss of 19,000 jobs in 1990 as average annual employment fell from 1989's 1,314,000 to 1,295,000. The decrease was due to large-scale layoffs in defense production activity, which were only partially offset by personnel gains in manufacture of commercial transports and space systems.

The 1990 employment figure represented 6.8 percent of the total employment in all U.S. manufacturing industries, the same percentage as in the previous year. It also represented 11.7 percent of the total employed by U.S. companies producing durable goods; the comparable figure for 1989 was 11.5 percent.

In line with the traditional pattern of employment distribution in the industry, more than half (54.5 percent) of the labor force was engaged in manufacture of aircraft, engines and parts. Annual average employment in that category was 706,000, down from 711,300 in the previous year.

Employment averaged 186,000 in the industry segment producing missiles and space vehicles. This segment absorbed a cut of 8,000 personnel, from an average level of 194,000 in 1989. Average employment in all other aerospace-related activities dipped from 1989's 409,000 to 403,000 in 1990.

The number of production workers in the industry declined by only slightly more than one percent, from 434,000 in 1989 to 429,000 in 1990. In aircraft, engines and parts manufacture, production workers numbered 341,700, roughly 80 percent of the total; the number was 57,000 in missiles/

space and 30,000 in the "other" aerospace-related category.

The annual payroll, at $35.6 billion, was up 3.6 percent over 1989's $34.4 billion; both figures include lump sum payments made by many aerospace firms in lieu of general wage or cost of living increases. The aerospace payroll represented 6.5 percent of combined payroll outlays by all U.S. manufacturing industries; the comparable figure for 1989 was 6.4 percent.

The average weekly earnings in the industry — again including lump sum payments — came to $637, up from $605 in 1989. Average hourly earnings amounted to $15.04, up from $14.37.

The average work week was 42.3 hours, compared with 42.1 hours in 1989.

In a year-end geographic breakdown of aerospace employment, the Pacific region dominated as usual but with a sharply reduced percentage of the total. Pacific led the eight geographic regions with 39.4 percent. The New England region remained second in 1990 with 13.6 percent. Next, in order, were the West North Central (9.1 percent),

South Central (9 percent), South Atlantic (8.6 percent), Middle Atlantic (8.2 percent), Mountain (6.4 percent), and East North Central (5.7 percent) regions.

The Pacific region also dominated in all product group breakdowns of aerospace employment. In civil aircraft manufacture, employment at companies in the Pacific region constituted 53.2 percent of the total. New England was a distant second at 16.4 percent; and the West North Central region was third at 9 percent.

In military aircraft production, the Pacific region led with 23.9 percent of the work force, followed by the South Central (19.6 percent) and West North Central (14.3 percent) regions. Regional breakdowns for the work force engaged in missile manufacture were: Pacific (36.8 percent), New England and Middle Atlantic combined (29.5 percent), and South Atlantic 15.3 percent. The Pacific region again led in space-related employment with 53.5 percent of the work force, followed by the Mountain (17.3 percent), and New England/Middle Atlantic (11.9 percent) regions.

ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING, DURABLE GOODS, AND AEROSPACE INDUSTRIES

Calendar years 1979 - 1990
(Thousands of Employees)

Year	All Manufacturing Industries	Durable Goods Industries[b]	Aerospace Industry[a]		
			TOTAL[b]	As Percent of All Manufacturing[b]	As Percent of Durable Goods[b]
1979	21,040	12,730	1,007	4.8%	7.9%
1980	20,285	12,159	1,080	5.3	8.9
1981	20,170	12,082	1,087	5.4	9.0
1982	18,781	11,014	1,038	5.5	9.4
1983	18,434	10,707	1,019	5.5	9.5
1984	19,378	11,479	1,058	5.5	9.2
1985	19,260	11,464	1,152	6.0	10.0
1986	18,965	11,203	1,242	6.5	11.1
1987	19,024	11,167	1,283	6.7	11.5
1988	19,350[r]	11,381	1,294	6.7	11.4
1989	19,442[r]	11,420	1,314	6.8	11.5
1990	19,111	11,115	1,295	6.8	11.7

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.
a See Glossary for detailed explanation of "Aerospace Employment."
b The Bureau of Labor Statistics revised its previously published estimates of employment for the period 1979-1989 to be consistent with their latest benchmarks.
r Revised.

ANNUAL PAYROLL
AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1979 - 1990
(Millions of Dollars)

Year	All Manufacturing Industries[a]	Aerospace Industry[b]			Aerospace As Percent of All Manufacturing[c]
		TOTAL[c]	Production Workers[c]	Other Workers[c]	
1979	$334,800	$15,150	$ 6,465	$ 8,685	4.5%
1980	355,600	18,026	7,658	10,368	5.1
1981	386,700	19,910	8,150	11,760	5.1
1982	384,000	20,750	8,043	12,707	5.4
1983	397,400	21,643	8,074	13,569	5.4
1984	439,100	23,780	8,746	15,034	5.4
1985	460,900	26,753	9,837	16,915	5.8
1986	473,200	29,554	11,038	18,517	6.2
1987	490,300	31,108	11,703	19,405	6.3
1988	524,000	32,576	11,750	20,826	6.2
1989	541,800	34,164	12,446	21,718	6.3
1990	546,800	35,356	12,928	22,428	6.5

AEROSPACE—INCLUDING LUMP-SUM PAYMENTS[d]

Year	TOTAL[c]	Production Workers[c]	Other Workers[c]	Aerospace As Percent of All Manufacturing[c]
1984	$23,825	$ 8,791	$15,034	5.4%
1985	26,789	9,873	16,915	5.8
1986	29,624	11,108	18,517	6.3
1987	31,269	11,865	19,405	6.4
1988	32,767	11,941	20,826	6.3
1989	34,406	12,688	21,718	6.4
1990	35,636	13,208	22,428	6.5

Source: Bureau of Economic Analysis, "Survey of Current Business" (Monthly) and Aerospace Industries Association estimates based on Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

a See Glossary for explanation of "Payroll, All Manufacturing."

b Based on combined annual average employment and average weekly earnings for SICs 372 and 376.

c The Bureau of Labor Statistics revised its previously published estimates of employment and earnings for the period 1979-1989 to be consistent with their latest benchmarks.

d Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are reported by BLS in separate wage series for SICs 3271 & 3761 and are included by AIA in the totals for production workers and all aerospace.

EMPLOYMENT IN THE AEROSPACE INDUSTRY[a]

Calendar Years 1979 - 1990
(Annual Average, Thousands of Employees)

Year	TOTAL[b]	Aircraft, Engines, & Parts[b] (SIC 372)	Missiles & Space Vehicles (SIC 376)	Other[bc]
TOTAL EMPLOYMENT				
1979	1,007	593	102	313
1980	1,080	633	111	336
1981	1,087	627	123	338
1982	1,038	584	131	323
1983	1,019	562	141	317
1984	1,058	575	154	329
1985	1,152	616	177	358
1986	1,242	656	200	386
1987	1,283	678	206	399
1988	1,294	684	208	402
1989	1,314	711	194[r]	409
1990	1,295	706	186	403
PRODUCTION WORKERS				
1979	378	322	33	24
1980	404	344	35	25
1981	395	333	37	25
1982	361	296	40	24
1983	343	274	46	24
1984	353	276	52	25
1985	384	295	62	27
1986	419	323	67	29
1987	435	339	67	30
1988	424	332	63	30
1989	434	344	60[r]	31
1990	429	342	57	30

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.
a See Glossary for detailed explanation of "Aerospace Employment."
b The Bureau of Labor Statistics revised its previously published estimates of employment for the period 1979-1989 to be consistent with their latest benchmarks.
c Communications, navigation, flight control, and displays (aerospace-related portions of SICs 3662, 381, & 382).
r Revised.

EMPLOYMENT IN THE AIRCRAFT, ENGINES, AND PARTS INDUSTRY[a]

Calendar Years 1979 - 1990
(Annual Average, Thousands of Employees)

Year	TOTAL[b] (SIC 372)	Airframes (SIC 3721)	Engines and Parts (SIC 3724)	Other Parts & Equipment[b] (SIC 3728)
TOTAL EMPLOYMENT				
1979	592.5	333.2	151.6	107.8
1980	633.1	349.3	162.9	120.9
1981	626.5	344.2	162.5	119.8
1982	584.0	319.9	148.8	115.3
1983	561.6	304.7	140.1	116.9
1984	575.1	306.1	140.2	128.8
1985	616.3	325.6	147.5	143.3
1986	656.0	338.9	153.6	163.4
1987	678.2	356.4	158.2	163.6
1988[r]	683.8	368.5	155.8	159.5
1989[r]	711.3	382.2	153.5	175.6
1990	706.0	376.5	151.3	178.2
PRODUCTION WORKERS				
1979	322.1	165.9	86.4	70.2
1980	343.9	173.7	93.0	77.4
1981	332.6	167.0	92.4	73.5
1982	296.2	144.7	84.2	67.4
1983	274.0	131.5	74.7	67.1
1984	276.0	128.2	73.0	73.5
1985	294.6	135.5	74.8	82.3
1986	322.5	146.6	78.7	94.5
1987	338.6	159.1	80.5	96.4
1988[r]	331.5	162.1	77.1	92.3
1989[r]	343.9	167.4	76.8	99.7
1990	341.7	162.2	77.0	102.5

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).
a See Glossary for detailed explanation of "Aerospace Employment."
b The Bureau of Labor Statistics revised its previously published estimates of employment for the period 1979-1989 to be consistent with their latest benchmarks.
r Revised.

AEROSPACE INDUSTRY EMPLOYMENT[a] BY OCCUPATIONAL CLASSIFICATION

As of December[b] 1982 - 1991
(Thousands of Employees)

Year	TOTAL	Production Workers	Scientists & Engineers	Technicians	Others
1982	765	353	134	54	224
1983[c]	765	344	135	55	231
1984	817	365	147	60	245
1985	898	405	163	66	264
1986	948	436	168	67	277
1987	968	436	175	69	288
1988	977	431	184	66	296
1989[c]	992	439	198	68	287
1990[p]	946	421	189	65	271
1991[E]	919	405	188	63	263

Source: Aerospace Industries Association, company reports and Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

NOTE: Employment estimates have been revised for 1982 and after to reflect recently released March 1988 benchmarks. Consequently, figures for years prior to 1982 are not directly comparable.

a Totals for employment by occupational classification reflect only establishments in SICs 372, 376, 3662, 381, and 382. As a result, they do not match the totals for aerospace employment by product group which include other industries with employment related to aerospace.

b End-of-year figures often differ from annual averages appearing in other tables.

c Industry strike during this period.

E Estimate.

p Preliminary.

GEOGRAPHIC DISTRIBUTION OF AEROSPACE EMPLOYMENT[a] BY OCCUPATIONAL CLASSIFICATION AND PRODUCT GROUP

As of December 1990

PERCENT DISTRIBUTION BY OCCUPATION

Region	TOTAL	Production Workers	Scientists & Engineers	Technicians	All Others
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%
New England	13.6%	17.4%	9.2%	10.6%	13.1%
Middle Atlantic	8.2	6.0	9.6	7.1	9.8
East North Central	5.7	7.3	4.5	4.5	5.0
West North Central	9.1	11.0	7.0	7.4	8.8
South Atlantic	8.6	5.1	10.3	10.8	10.8
South Central	9.0	9.3	9.0	4.7	9.7
Mountain	6.4	6.0	7.7	8.0	5.6
Pacific	39.4	37.9	42.7	46.9	37.2

PERCENT DISTRIBUTION BY PRODUCT GROUP

Region	Total	Aircraft		Missiles	Space	Other	
		Civil	Military			Aero	Non-Aero
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
New England	13.6%	16.4%	11.2%	29.5%	11.9%	13.3%	32.3%
Middle Atlantic	8.2	2.0	10.3			14.3	
East North Central	5.7	8.1	9.0	8.5	0.2	13.5	13.1
West North Central	9.1	9.0	14.3				
South Atlantic	8.6	7.6	6.5	15.3	10.4	11.8	36.0
South Central	9.0		19.6	3.0	6.7	5.4	
Mountain	6.4	3.7	5.2	6.9	17.3	4.9	18.6
Pacific	39.4	53.2	23.9	36.8	53.5	36.8	

Source: Aerospace Industries Association, company reports.
NOTE: Data for two regions are combined where employment for one region within a product group represented three or fewer companies.
a Employment in 40 surveyed aerospace manufacturing companies accounted for approximately two-thirds of total industry employment.

TOTAL EMPLOYMENT AND SCIENTISTS & ENGINEERS IN COMMERCIAL TRANSPORT AIRCRAFT & HELICOPTER MANUFACTURING ESTABLISHMENTS[a]

As of December 1977 - 1991

Year	Commercial Transport Aircraft		Helicopters	
	Total	Scientists & Engineers	Total	Scientists & Engineers
1977[b]	55,900	8,100	21,100	3,500
1978	58,700	8,700	24,200	3,300
1979	99,800	12,900	27,500	3,000
1980	106,500	13,700	29,800	3,200
1981	84,000	12,000	28,000	3,000
1982	69,000[r]	11,100	26,500[r]	3,100
1983[b]	49,400[r]	8,600[r]	27,600	3,500
1984	59,100[r]	9,400[r]	31,300	3,800
1985[r]	69,200	11,000	37,900	5,000
1986	79,100	12,900	37,400[r]	4,000
1987	88,100	14,400	39,000[r]	4,300[r]
1988	99,100	15,900	36,600[r]	4,200[r]
1989[b]	119,700	14,900	34,200	4,900
1990[p]	121,000	16,600	32,400	4,600
1991[E]	118,100	17,400	31,700	4,400

Source: Aerospace Industries Association, company reports.
NOTE: Revised figures include AIA estimates of employment at unreported establishments.
a Includes only establishments identified as prime manufacturers of commercial transport aircraft and of civil and military helicopters. Excludes subcontractors and propulsion manufacturers.
b Industry strike during this period.
E Estimate.
p Preliminary.
r Revised.

AVERAGE HOURLY EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1974 - 1990

Year	TOTAL[a]	Aircraft (SIC 372)				Guides Missiles, Space Vehicles & Parts (SIC 376)	
		TOTAL[a]	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	TOTAL[a]	Guided Missiles & Space Vehicles (SIC 3761)
AVERAGE HOURLY EARNINGS[b]							
1974	$ 5.43	$ 5.42	$ 5.58	$ 5.41	$ 5.05	$ 5.48	$ 5.44
1975	6.00	6.00	6.21	6.04	5.47	6.02	5.99
1976	6.44	6.44	6.63	6.46	5.95	6.48	6.49
1977	6.93	6.92	7.07	7.05	6.44	7.04	7.15
1978	7.54	7.54	7.70	7.80	6.93	7.56	7.72
1979	8.26	8.26	8.50	8.53	7.48	8.25	8.38
1980	9.27	9.28	9.66	9.42	8.40	9.22	9.33
1981	10.29	10.31	10.74	10.41	9.35	10.06	10.34
1982	11.20	11.23	11.85	11.16	10.17	10.95	11.21
1983	11.79	11.82	12.58	11.61	10.73	11.59	11.84[r]
1984	12.24	12.32	12.91	12.40	11.37	11.82	12.01
1985	12.54	12.62	13.18	12.85	11.66[r]	12.14	12.36
1986	12.75	12.86	13.48	13.08	11.90	12.20	12.48
1987	13.10	13.17	13.74	13.33	12.23	12.73	13.09[r]
1988	13.48[r]	13.55[r]	14.18	13.80	12.28[r]	13.13[r]	13.53[r]
1989	14.10[r]	14.17[r]	14.89	14.42	12.81[r]	13.70[r]	14.20
1990	14.72	14.78	15.66	14.84	13.37	14.39	14.82
AVERAGE HOURLY EARNINGS INCLUDING LUMP-SUM WAGE PAYMENTS[c]							
1984	$12.37[r]	$12.46[r]	$13.11	$12.40	$11.37	$11.92	$12.14
1985	12.69[r]	12.77[r]	13.40	12.85	11.66[r]	12.29	12.56
1986	12.94[r]	13.06[r]	13.80	13.08	11.90	12.33	12.66
1987	13.37[r]	13.48[r]	14.32	13.33	12.23	12.80	13.19
1988	13.72[r]	13.79[r]	14.65	13.80	12.28[r]	13.36	13.87
1989[r]	14.37	14.44	15.41	14.42	12.81	13.98	14.63
1990	15.04	15.10	16.32	14.84	13.37	14.68	15.26

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.

a TOTAL columns are employment-based weighted averages.

b Includes overtime premiums.

c Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are reported by BLS in separate wage series for SICs 3721 & 3761 and are included by AIA in totals.

r Revised.

AVERAGE WEEKLY EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1979 - 1990

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)	
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	TOTAL[a]	Guided Missiles & Space Vehicles (SIC 3761)
AVERAGE WEEKLY EARNINGS[b]							
1979	$351	$351	$360	$361	$322	$347	$348
1980	389	390	404	394	358	378	383
1981	424	426	444	422	396	410	420
1982	460	462	485	454	426	447	461
1983	486	487	513	476	453	480	494r
1984	513	516	532	523	486	496	508
1985	531	534	547	542	506	515	527
1986	545	550	568	561	520	517	533
1987	556	558	578	567	523	541	556
1988	573r	575r	596	582	529r	567r	585r
1989	593r	594r	616	616	542r	589r	611
1990	623	625	656	637	570	612	634
AVERAGE WEEKLY EARNINGS INCLUDING LUMP-SUM PAYMENTS[c]							
1984	$516r	$519r	$540	$523	$486	$501	$514
1985	532r	535r	556	542	506	521	535
1986	548r	553r	581	561	520	523r	541
1987	563r	567r	603	567	523	544	561
1988	583r	584r	615	582	529r	577	599
1989	605r	605r	638r	616	542r	601r	629r
1990	637	639	684	637	570	624	653

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.
NOTE: The Bureau of Labor Statistics revised its previously published estimates of employment and earnings for the period 1979-1989 to be consistent with their latest benchmarks.

a TOTAL columns are employment-based weighted averages.
b Includes overtime premiums.
c Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are reported by BLS in separate wage series for SICs 3721 & 3761 and are included by AIA in totals.
r Revised.

AVERAGE HOURS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1976 - 1990

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)	Complete Guided Missiles, & Space Vehicles (SIC 3761)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)		
AVERAGE WEEKLY HOURS							
1976	40.9	40.9	41.2	40.2	41.3	40.5	NA
1977	41.8	41.9	41.9	41.4	42.5	40.9	40.5
1978	42.2	42.2	42.1	41.7	43.1	41.9	40.9
1979	42.5	42.5	42.3	42.3	43.1	42.0	41.5
1980	41.9	42.0	41.8	41.8	42.6	41.0	41.1
1981	41.3	41.3	41.3	40.5	42.4	40.8	40.6
1982	41.1	41.1	40.9	40.7	41.9	40.8	41.1
1983	41.2	41.2	40.8	41.0	42.2	41.4	41.7
1984	41.9	41.9	41.2	42.2	42.7	42.0	42.3
1985	42.3	42.3	41.5	42.2	43.4	42.4	42.6
1986	42.7	42.8	42.1	42.9	43.7	42.4	42.7
1987	42.4	42.4	42.1	42.5	42.8	42.5	42.5
1988	42.5	42.4	42.0	42.2	43.1r	43.2	43.2
1989	42.1r	41.9r	41.4	42.7	42.3r	43.0	43.0
1990	42.3	42.3	41.9	42.9	42.6	42.5	42.8

AVERAGE WEEKLY OVERTIME HOURS

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)	Complete Guided Missiles, & Space Vehicles (SIC 3761)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)		
1976	2.7	2.7	NA	NA	NA	2.7	NA
1977	3.5	3.5	2.8	3.9	4.5	3.2	2.8
1978	4.4	4.4	3.6	5.0	5.3	4.1	3.4
1979	4.7	4.7	4.1	5.1	5.3	4.4	3.8
1980	4.1	4.2	3.5	5.0	5.0r	3.6	3.2
1981	3.5	3.5	3.1	3.5	4.4	3.2	2.9
1982	3.2	3.2	2.7	3.6	3.7	3.1	3.1
1983	3.1	3.1	2.5	3.7	3.7r	3.3	3.5
1984	3.9	4.0	3.0	5.1	4.6	3.3	3.4
1985	4.6	4.6	3.5	5.4	5.3	4.6	5.0
1986	4.8	4.9	4.2	5.5	5.5	4.4	4.7
1987	4.8	4.9	4.4	5.0	5.4	4.2	4.3
1988	4.6r	4.6r	4.3	4.6	5.1r	4.5	4.6
1989	5.0r	5.1r	5.0	5.4	5.0r	4.4	4.5
1990	4.5	4.6	4.3	5.3	4.5	3.8	4.1

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.
a TOTAL columns are employment-based weighted averages.
NA Not available.
r Revised.

OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES[a] ALL MANUFACTURING AND AEROSPACE INDUSTRIES

Calendar Years 1985 - 1989

	1985	1986	1987	1988	1989
All Manufacturing:					
Total Cases	10.4	10.6	11.9	13.0r	13.1
Lost Workday Cases	4.6	4.7	5.3	5.7	5.8
Nonfatal Cases without Lost Workdays	5.8	5.9	6.7	7.3	7.3
Lost Workdays	80.2	85.2	95.5	107.3r	113.0
Aircraft and Parts (SIC 372):					
Total Cases	6.4	7.0	8.3	9.9r	10.1
Lost Workday Cases	2.5	2.6	3.1	3.6	3.7
Nonfatal Cases without Lost Workdays	3.9	4.4	5.2	6.3	6.4
Lost Workdays	43.1	43.8	55.7	67.9r	70.2
Aircraft (SIC 3721):					
Total Cases	5.4	6.6	7.4	10.1	10.2
Lost Workday Cases	2.0	2.1	2.6	3.3	3.5
Nonfatal Cases without Lost Workdays	3.5	4.5	4.8	6.7	6.7
Lost Workdays	35.8	38.3	48.0	66.1	70.5
Aircraft Engines and Parts (SIC 3724):					
Total Cases	5.2	5.4	7.1	8.7	7.9
Lost Workday Cases	2.7	2.8	3.4	3.7	3.7
Nonfatal Cases without Lost Workdays	2.5	2.6	3.7	5.0	4.2
Lost Workdays	52.0	48.0	67.4	81.9	72.5
Aircraft Parts (SIC 3728):					
Total Cases	9.4	9.0	10.8	10.5r	12.0
Lost Workday Cases	3.4	3.3	3.9	3.9	4.1
Nonfatal Cases without Lost Workdays	6.0	5.7	6.9	6.6r	7.8
Lost Workdays	50.1	50.1	60.4	59.1r	67.7
Guided Missiles, Space Vehicles & Parts (SIC 376):					
Total Cases	2.8	3.1	4.4	4.6	4.8
Lost Workday Cases	1.2	1.5	2.0	2.2	2.2
Nonfatal Cases without Lost Workdays	1.5	1.6	2.4	2.4	2.6
Lost Workdays	23.1	28.3	34.0	41.3	39.7
Guided Missiles & Space Vehicles (SIC 3761):					
Total Cases	2.5	2.8	4.3	4.6	4.6
Lost Workday Cases	1.2	1.4	2.2	2.3	2.2
Nonfatal Cases without Lost Workdays	1.3	1.4	2.2	2.3	2.5
Lost Workdays	23.0	29.5	37.4	44.6	41.4
Space Propulsion Units & Parts (SIC 3764):					
Total Cases	4.1	4.8	4.5	4.5	4.6
Lost Workday Cases	1.7	1.7	1.8	1.9	2.1
Nonfatal Cases without Lost Workdays	2.4	3.1	2.7	2.6	2.5
Lost Workdays	27.8	29.2	34.3	32.6	33.5
Other Space Vehicle Equipment (SIC 3769):					
Total Cases	3.1	3.1	4.2	NA	5.6
Lost Workday Cases	1.1	1.3	1.2	NA	2.3
Nonfatal Cases without Lost Workdays	2.0	1.8	3.0	NA	3.3
Lost Workdays	20.6	21.0	16.3	NA	41.5

Source: Bureau of Labor Statistics, "Occupational Injuries and Illnesses in the United States by Industry" (Annually).

[a] Defined as the number of injuries and illnesses per 100 full-time workers. Separate incidence rates also available for occupational injuries only.

NA Not available.

r Revised.

FEDERAL CIVILIAN EMPLOYMENT[a] IN THE DEPARTMENT OF DEFENSE

Fiscal Years 1967 - 1993

Year	TOTAL	Civil Functions[b]	Military Functions[c]
1967	1,225,637	31,980	1,193,657
1968	1,288,130	32,062	1,256,068
1969	1,257,091	31,214	1,225,877
1970	1,159,935	30,293	1,129,642
1971	1,092,804	30,063	1,062,741
1972	1,040,147	30,585	1,009,562
1973	987,281	29,971	957,310
1974	1,002,850	29,072	973,778
1975	983,790	29,069	954,721
1976	951,034	28,648	922,386
1977	940,549	28,912	911,637
1978	933,071	28,962	904,109
1979	914,582	28,592	885,990
1980	907,700	27,700	880,000
1981	981,400	34,400	947,000
1982	1,009,344	31,263	978,081
1983	1,015,779	30,973	984,806
1984	1,040,213	28,681	1,011,532
1985	1,065,551	28,681	1,036,870
1986	1,069,863	28,511	1,041,352
1987	1,059,516	28,199	1,031,317
1988	1,052,848	28,267	1,024,581
1989	1,051,019	27,934	1,023,085
1990	1,049,422	28,259	1,021,163
1991[E]	1,012,304	28,007	984,297
1992[E]	970,128	27,944	942,184
1993[E]	932,638	27,757	904,881

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).

a Full-time equivalent civilian employment.

b Data are estimated for portions of Civil Functions.

c The Department of Defense is exempt from full-time equivalent controls. Data shown are estimated civilian employment for military functions and military assistance.

E Estimate.

EMPLOYMENT IN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

End of Fiscal Years 1961 - 1992

Year	TOTAL	NASA Employees	Contractor Employees[a]
1961	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982	127,952	21,652	106,300
1983	129,246	22,246	107,000
1984	162,080	22,080	140,000
1985	131,991	21,991	110,000
1986	154,660	21,660	133,000
1987	165,001	22,001	143,000
1988	172,326	22,326	150,000
1989	213,054	23,054	190,000
1990	221,829	23,829	198,000
1991[E]	223,197	24,197	199,000
1992[E]	242,032	25,032	217,000

Source: Office of Management and Budget, "Budget of the United States Government" (Annually) and NASA Headquarters.

a Includes estimates of manpower for hardware and related contracts, as well as actual work-years for support service contracts. Increase in FY 1984 caused by change in estimating methodology to reflect more accurately the mix of support and development contractors.

E Estimate.

AEROSPACE INDUSTRY WORK STOPPAGES[a]

Calendar Years 1979 - 1990

Year	Number of Strikes[b]	Number of Workers Involved	Work-Days Idle in Year
1979	12	6,600	103,400
1980	17	4,400	92,900
1981	12	6,100	188,900
1982[c]	4	11,900	45,200
1983	2	8,700	404,100
1984	4	14,600	188,200
1985	4	19,700	289,800
1986	-	-	-
1987	-	-	-
1988	3	10,600	415,800
1989	2	58,500	1,848,000
1990	1	2,300	56,700

Source: Bureau of Labor Statistics, "Current Wage Developments" (Monthly).

a Based on SIC 372 of the 1967 Code, which includes missile and space propulsion units and parts and missile and space vehicle equipment not elsewhere classified, but which excludes complete guided missiles and space vehicles.

b Strikes beginning during calendar year.

c Effective 1982, data not available for work stoppages involving fewer than 1,000 employees.

EMPLOYMENT AND COST OF R&D SCIENTISTS AND ENGINEERS ALL INDUSTRIES AND AEROSPACE INDUSTRY

Calendar Years 1979 - 1990

Year	Employment[a]			Cost Per R&D Scientist and Engineer[d]	
	All Industries[b] (Thousands)	Aerospace[c] (Thousands)	Aerospace as a Percent of All Industries	All Industries[b]	Aerospace[c]
1979	423.9	86.5	20.4%	$ 87,400	$ 93,300
1980	450.6	85.9	19.1	94,900	101,600
1981	487.8	95.2	19.5	103,900	128,500*r*
1982	509.8	91.1	17.9	111,600	148,800
1983	540.9	103.1	19.1	116,000	143,600
1984	584.1	111.5	19.1	12[illegible],000	156,000
1985	622.5	130.2	20.9	130,200	161,700
1986	671.0	144.8	21.6	128,500	149,800
1987*r*	695.8	136.3	19.6	131,200	179,400
1988	708.6	136.4	19.2	137,000*r*	185,900*r*
1989*r*	720.2	142.3	19.8	140,000	184,800
1990	731.7	135.3	18.5	NA	NA

Source: National Science Foundation.

a Employment as of January. Scientists and engineers working less than full time have been included in terms of their full time equivalent number.

b All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.

c Standard Industrial Classification codes 372 and 376.

d The arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years, divided into the total R&D expenditures of each industry during the earlier year.

NA Not available.

r Revised.

91-92 Finance

Aerospace industry profits in 1990 rebounded from the sharp drop experienced in 1989 but remained below the levels of the preceding two years (1987-88). The 1990 net profit was $4.5 billion, up from $3.9 billion in 1989.

The gain resulted from a significant increase in overall sales, principally sales of commercial transports and space systems. The aerospace profit was achieved on 1990 sales of $133.6 billion, which represents an increase of almost 13 percent over 1989 sales of $118.3 billion.

Expressed as a percentage of sales, the 1990 profit amounted to 3.4 percent, up slightly from 1989's 3.3 percent. The aerospace figure, however, remained below the average for all U.S. manufacturing corporations, which in 1990 was 4 percent.

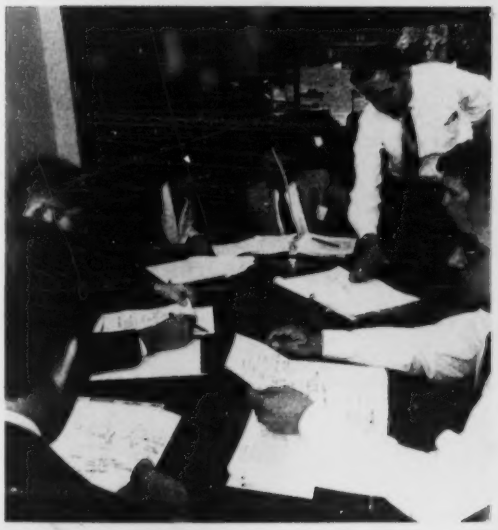
As a percentage of assets, the aerospace profit was also 3.4 percent (up from 3.3 percent) and as a percentage of equity it came to 11.5 percent (up from 10.7 percent). The comparable figures for all-manufacturing industries were 4.3 percent and 10.7 percent.

At $4 billion in current dollars, the industry's outlays for new plant and equipment fell below 1989's all-time record figure of $4.2 billion, but they were still higher than any other year in history. For 1991, the Bureau of the Census estimated a decline to $3.9 billion.

The aerospace industry's balance sheet, as reported by the Bureau of the Census, showed an increase in net working capital from $12.6 billion in 1989 to $14.3 billion in 1990. Total assets amounted to $131.8 billion, up from $121.9 billion in 1989.

With contracts totaling $8.2 billion in FY 1990, McDonnell Douglas Corporation was once again the leading Department of Defense contractor in terms of awarded contract dollar value; it was the company's fourth straight year at the top of the list. In second place was General Dynamics Corporation with $6.3 billion, followed by General Electric Company ($5.6 billion), General Motors Corporation ($4.1 billion), and Raytheon Company ($4.1 billion).

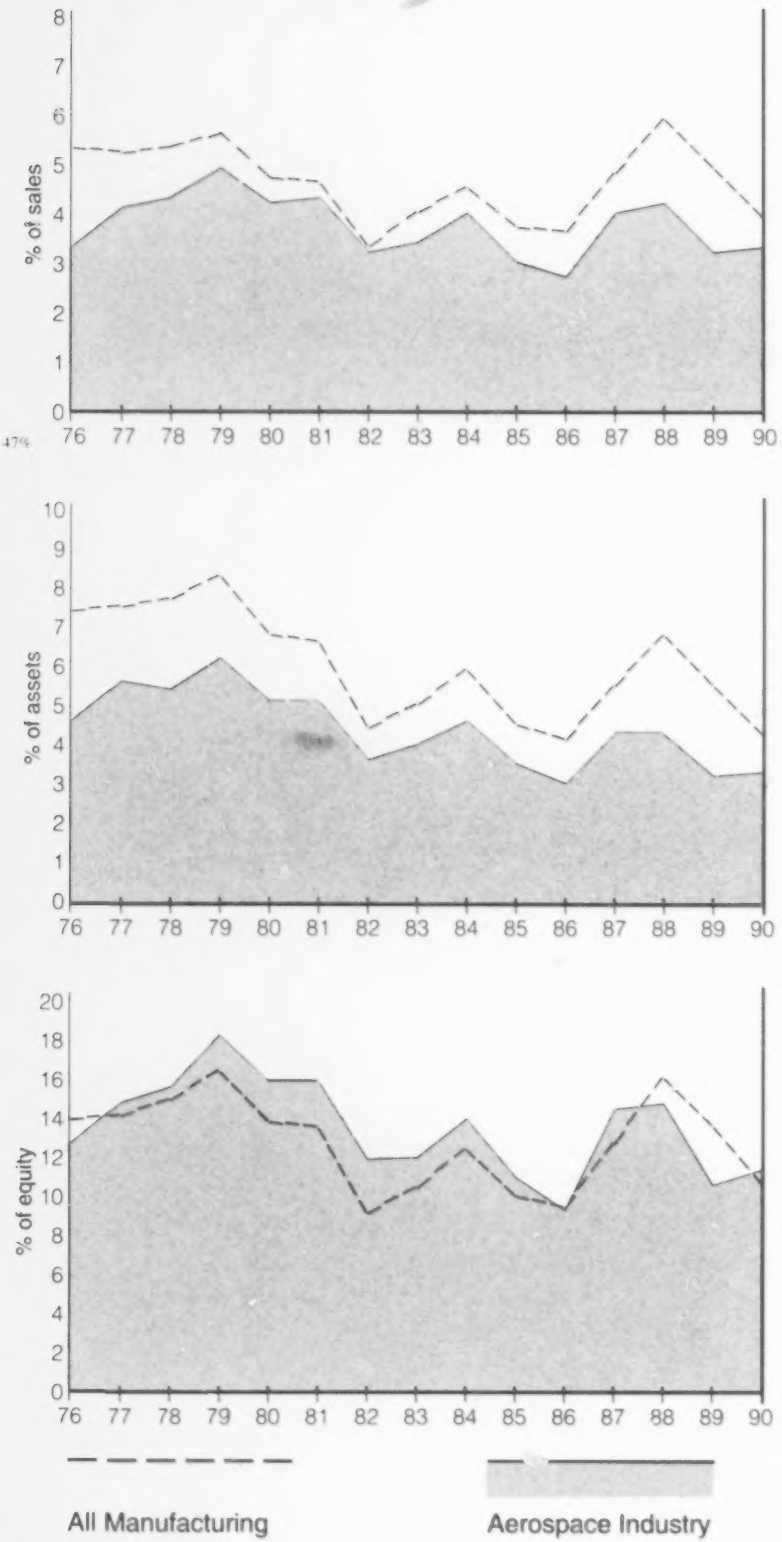
Rounding out DoD's top 10 contractors were Lockheed Corporation ($3.6 billion), Martin Marietta Corporation ($3.5 billion), United Technologies Corporation ($2.9 billion), Grumman Corporation ($2.7 billion) and Tenneco Inc. ($2.4 billion). All but Tenneco placed in the top 10 in 1989; Tenneco replaced The Boeing Company, which slipped to 11th place.



Perennial leader Rockwell International Corporation once again headed the list of NASA's top contractors, with FY 1990 awards totaling $1.7 billion. McDonnell Douglas ($851 million) was second, followed by Lockheed Space Operations Company ($583 million), Martin Marietta ($507 million) and Thiokol Corporation ($498 million).

The rest of NASA's top 10 included General Electric Company ($402 million), The Boeing Company ($399 million), Rockwell Space Operations Inc. ($309 million), Lockheed Missiles and Space Company ($294 million), and TRW Inc. ($241 million). In comparison with FY 1989, the latter two companies are new to the top 10 list; they replaced Lockheed Engineering & Science Company (11th in 1990) and Ford Aerospace Corporation (15th).

Net Profit after Taxes



Source: Aerospace Industries Association

NET PROFIT AFTER TAXES AS A PERCENT OF SALES, ASSETS, AND EQUITY FOR ALL MANUFACTURING CORPORATIONS AND THE AEROSPACE INDUSTRY[a]

Calendar Years 1976 - 1990

PERCENT OF SALES

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace Industry
1976	5.4%	5.5%	5.2%	3.4%
1977	5.3	5.3	5.3	4.2
1978	5.4	5.4	5.5	4.4
1979	5.7	6.1	5.2	5.0
1980	4.8	5.6	4.0	4.3
1981	4.7	5.1	4.3	4.4
1982	3.5	4.6	2.4	3.3
1983	4.1	4.9	3.1	3.5
1984	4.6	4.8	4.4	4.1
1985	3.8	4.1	3.4	3.1
1986	3.7	4.6	2.9	2.8
1987	4.9	5.2	4.5	4.1
1988	6.0	6.7	5.2	4.3
1989	5.0	5.8[r]	4.1	3.3
1990	4.0	4.9	3.0	3.4

PERCENT OF ASSETS[b] AND EQUITY[b]

Year	Percent of Assets		Percent of Equity	
	All Manufacturing	Aerospace Industry	All Manufacturing	Aerospace Industry
1976	7.5%	4.7%	14.0%	12.8%
1977	7.6	5.7	14.2	14.9
1978	7.8	5.5	15.0	15.7
1979	8.4	6.3	16.5	18.4
1980	6.9	5.2	13.9	16.0
1981	6.7	5.2	13.6	16.0
1982	4.5	3.7	9.2	12.0
1983	5.1	4.1	10.5	12.1
1984	6.0	4.7	12.5	14.1
1985	4.6	3.6	10.1	11.1
1986	4.2	3.1	9.5	9.4
1987	5.6	4.4	12.8	14.6
1988	6.9	4.4	16.2	14.9
1989	5.6	3.3	13.7	10.7
1990	4.3	3.4	10.7	11.5

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations" (Quarterly).

a Based on a sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, their propulsion, and parts.

b Average of four quarters.

r Revised.

INCOME STATEMENT AND OPERATING RATIOS FOR AEROSPACE COMPANIES[a]

Calendar Years 1987 - 1990
(Millions of Dollars)

INCOME STATEMENT	1987	1988	1989[r]	1990
Net Sales, Receipts, Operating Revenues	$110,992	$112,846	$118,297	$133,618
Less: Depreciation, Depletion, & Amortization of Property, Plant, and Equipment	3,636	3,775	4,014	4,250
Less: All Other Operating Costs & Expenses, Including Selling Costs & General & Administrative Expenses	101,053	103,098	108,824	122,678
Income (or Loss) from Operations	$ 6,303	$ 5,972	$ 5,460	$ 6,692
Net Non-Operating Income (Expense)	499	739	(20)	(544)
Income (or Loss) Before Income Taxes (= Total Income)	$ 6,801	$ 6,711	$ 5,439	$ 6,147
Less: Provision for Current & Deferred Domestic Income Taxes	2,219	1,828	1,574	1,660
Income (or Loss) after Income Taxes (= Net Profit)	$ 4,582	$ 4,883	$ 3,866	$ 4,487
Cash Dividends Charged to Retained Earnings	1,457	1,465	1,806	1,823
Net Income Retained in Business	$ 3,125	$ 3,417	$ 2,060	$ 2,665
Retained Earnings at Beginning of Year[b]	22,128	24,139	27,508	28,227
Adjustments to Retained Earnings[c]	(371)	(66)	(931)	(350)
Retained Earnings at End of Year[d]	$ 24,882	$ 27,490	$ 28,637	$ 30,541
OPERATING RATIOS				
Income before Taxes as Percent of Net Sales	6.1%	5.9%	4.6%	4.6%
Provision for Current & Deferred Domestic Income Taxes as Percent of Income before Taxes (Total Income)	32.6	27.2	28.9	27.0
Income after Taxes (Net Profit) as Percent of Net Sales	4.1	4.3	3.3	3.4
Income after Taxes (Net Profit) as Percent of Stockholders' Equity[e]	14.6	14.9	10.7	11.5
Income after Taxes (Net Profit) as Percent of Total Assets[e]	4.4	4.4	3.3	3.4

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations" (Quarterly).
NOTE: Detail may not add to totals because of rounding.

a Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and their propulsion, and parts.

b Beginning-of-year retained earnings for any particular year do not equal end-of-year retained earnings for the previous year because of rotation of small companies in survey sample.

c Other direct credits (or charges) to retained earnings (net), including stock and other non-cash dividends, etc.

d Retained Earnings at End of Year CALCULATED AS Retained Earnings at Beginning of Year PLUS Income (Loss) after Income Taxes MINUS Cash Dividends Charged to Retained Earnings PLUS Adjustments to Retained Earnings.

e Average of four quarters.

r Revised.

BALANCE SHEET FOR AEROSPACE COMPANIES[a]

December 31, 1987 - 1990
(Millions of Dollars)

	1987	1988	1989[r]	1990
Assets:				
Current Assets				
Cash	$ 3,592	$ 2,156	$ 1,480	$ 2,172
Securities, Com'l Paper, & Other Short-Term Financial Investments	2,365	3,328	1,785	2,920
Total Cash and U.S. Gov't and Other Securities	$ 5,956	$ 5,484	$ 3,264	$ 5,092
Receivables (Total)	15,576	16,102	18,732	19,620
Inventories (Gross)	44,812	45,558	49,944	50,423
Other Current Assets	1,612	1,576	2,391	2,327
Total Current Assets	$ 67,957	$ 68,720	$ 74,332	$ 77,463
Net Plant, Property, & Equipment	22,017	22,211	24,506	26,161
Other Non-Current Assets	16,882	18,614	23,053	28,199
Total Assets	$106,856	$109,545	$121,892	$131,823
Liabilities:				
Current Liabilities				
Short-Term Loans	$ 1,551	$ 1,369	$ 3,799	$ 2,677
Trade Accounts & Notes Payable	9,706	10,424	10,898	12,445
Income Taxes Accrued	6,393	3,519	1,925	2,002
Installments Due on Long-Term Debt.	1,109	751	1,269	1,392
Other Current Liabilities	39,744	40,825	43,813	44,690
Total Current Liabilities	$ 58,502	$ 56,888	$ 61,704	$ 63,205
Long-Term Debt	10,855	12,447	16,191	20,979
Other Non-Current Liabilities	5,807	6,342	7,081	7,741
Total Liabilities	$ 75,164	$ 75,676	$ 84,976	$ 91,926
Stockholders' Equity:				
Capital Stock	$ 6,810	$ 6,379	$ 8,661	$ 9,510
Retained Earnings	24,882	27,490	28,255	30,386
Total Stockholders' Equity	$ 31,692	$ 33,869	$ 36,916	$ 39,896
Total Liabilities & Stockholders' Equity	$106,856	$109,545	$121,892	$131,823
Net Working Capital	$ 9,455	$ 11,832	$ 12,628	$ 14,257

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations" (Quarterly).
NOTE: Detail may not add to totals because of rounding.
a Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, their propulsion, and parts.
r Revised.

NEW PLANT AND EQUIPMENT EXPENDITURES

Calendar Years 1964 - 1991
(Billions of Dollars)

Year	All Industries	All Manufacturing Industries	Durable Goods	Aerospace[a]	
				Current Dollars	Constant Dollars[b] (1982 = 100)
1964	$ 51.26	$ 21.23	$10.98	$0.41	$1.23
1965	59.52	25.41	13.49	0.53	1.57[b]
1966	70.40	31.37	17.23	1.17	3.38
1967	72.75	32.25	17.83	1.25	3.49[b]
1968	76.42	32.34	17.93	1.23	3.32[b]
1969	85.74	36.27	19.97	1.29	3.37[b]
1970	91.91	36.99	19.80	0.88	2.19[b]
1971	92.91	33.60	16.78	0.63	1.51[b]
1972	103.40	35.42	18.22	0.68	1.59[b]
1973	120.03	42.35	22.63	0.79	1.79[b]
1974	139.67	52.48	26.77	1.21	2.40[b]
1975	142.42	53.66	25.37	1.19	2.04[b]
1976	158.44	58.53	27.50	1.02	1.64[b]
1977	184.82	67.48	32.77	1.14	1.72[b]
1978[c]	216.81	78.13	39.02	1.77	2.48[b]
1979[c]	255.26	95.13	47.72	2.71	3.50[b]
1980[c]	286.40	112.60	54.82	3.60	4.20[b]
1981[c]	324.73	126.68	58.93	3.40	3.59[b]
1982[c]	326.19	123.97	54.58	3.45	3.45[b]
1983[c]	321.16	117.35	51.61	2.95	2.87[b]
1984[c]	373.83	139.61	64.57	3.63	3.45[b]
1985[c]	410.12	152.88	70.87	3.51	3.27[b]
1986[c]	399.36	137.95	65.68	3.86	3.52[b]
1987[c]	410.52	141.06	68.03	3.60	3.22[b]
1988[c]	455.49	163.45	77.04	3.49	3.05[b]
1989[c]	507.40	183.80	82.56	4.17	3.51[b]
1990	532.96	192.78	82.99	4.05	3.30[b]
1991[E]	547.23	190.17	80.06	3.85	NA

Source: Bureau of the Census, "Plant and Equipment Expenditures and Plans" (Quarterly).

a Data are company-based (not establishment nor product-based) and represent corporate entities whose principal activity falls in SIC codes 372 and 376.

b The Census Bureau discontinued its reporting of new plant and equipment expenditures in constant dollars following 1989's 4th quarter report. AIA has employed the Producer Price Index, Capital Equipment to deflate spending.

c The Census Bureau revised its previously published estimates of new plant and equipment expenditures for the period 1978 - 1989 to be consistent with their revised benchmark obtained through the 1982 Economic Census.

E Estimate.

NA Not Available.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1986 - 1990
By rank according to net value of NASA prime contracts awarded during last fiscal year
(Millions of Dollars)

Company	1986	1987	1988	1989	1990
TOTAL PROCUREMENTS	$8,180	$8,610	$9,545	$10,876	$12,565
Awards to Business Firms	6,356	6,541	7,275	8,568	10,072
% of TOTAL PROCUREMENTS	78%	76%	76%	79%	80%
Rockwell International Corp.	$1,156	$1,610	$1,714	$ 1,692	$ 1,747
McDonnell Douglas Corp.	266	285	299	506	851
Lockheed Space Operations Co.	559	323	474	553	583
Martin Marietta Corp.	427	326	341	355	507
Thiokol Corp.	320	286	423	420	498
General Electric Co.[b]	207	225	211	300	402
The Boeing Co.	113	175	260	236	399
Rockwell Space Operations Inc.	(a)	(a)	(a)	287	309
Lockheed Missiles & Space Co.	121	108	141	145	294
TRW Inc.	85	124	143	193	241
Lockheed Engrg. & Science Co.	124	163	178	217	234
USBI Booster Production Co.	196	183	191	196	233
EG&G Florida Inc.	117	131	156	187	191
Computer Sciences Corp.	96	90	151	192	183
Ford Aerospace Corp.	208	120	137	196	174
Boeing Computer Support Services	(a)	(a)	(a)	158	165
Allied Signal Aerospace Co.[c]	138	142	152	156	156
United Technologies Corp.	97	166	91	133	136
IBM Corp.	94	72	87	102	102
Grumman Aerospace Corp.	9	23	74	80	86
Sverdrup Technology Inc.	15	27	38	65	79
Teledyne Industries Inc.	48	38	40	52	73
Contel Corp.	69	81	76	51	65
Pan American World Serv. Inc.	47	60	70	60	65
CAE Link Corp.	(a)	(a)	(a)	16	53
Fairchild Industries Inc.	26	24	24	38	44
Cray Research Inc.	10	11	31	48	43
BAMSI Inc.	19	31	40	30	38
NSI Technology Serv. Corp.	(a)	(a)	25	36	38
Unisys Corp.	(a)	27	23	34	37

Source: National Aeronautics and Space Administration, "Annual Procurement Report" (Annually).
a Not in list of major contractors for indicated year(s).
b Includes awards previously reported for RCA Corp.
c Reported in FY 89 and FY 90 as Bendix Field Engineering.

DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1986 - 1990
Listed by rank according to net value of prime contracts awarded during last fiscal year
(Millions of Dollars)

Company	1986	1987	1988	1989	1990
TOTAL CONTRACTS	$145,742	$142,483	$137,049	$128,958	$130,758
McDonnell Douglas Corp.	$ 6,586	$ 7,715	$ 8,003	$ 8,617	$ 8,211
General Dynamics Corp.	8,013	7,041	6,522	6,899	6,306
General Electric Co.	6,847	5,802	5,701	5,771	5,589
General Motors Corp.[a]	5,069	4,082	3,550	3,692	4,107
Raytheon Co.	4,052	3,820	4,055	3,761	4,071
Lockheed Corp.	4,896	5,574	3,538	3,652	3,553
Martin Marietta Corp.	2,935	3,726	3,715	3,337	3,492
United Technologies Corp.	3,527	3,587	3,508	3,556	2,856
Grumman Corp.	2,967	3,393	2,848	2,373	2,697
Tenneco Inc.	477	2,053	5,058	916	2,410
The Boeing Co.	3,556	3,547	3,018	2,868	2,267
Westinghouse Electric Corp.	1,713	1,684	2,185	1,650	2,243
Rockwell International Corp.	5,590	2,238	2,184	2,133	2,217
Litton Industries Inc.	1,663	2,035	2,561	1,437	1,576
Honeywell Inc.	1,846	2,008	1,366	1,555	1,388
Unisys Corp.[b]	1,897	2,268	1,380	1,245	1,376
GTE Corp.	1,041	1,475	423	2,342	1,294
IBM Corp.	1,359	1,822	1,065	1,309	1,286
Textron Inc.	1,671	1,546	1,276	908	1,190
LTV Corp.	1,445	1,308	942	757	1,183
Gencorp Inc.	643	874	639	789	1,133
TRW Inc.	1,053	1,135	1,250	1,294	1,087
AT&T Co.	914	641	565	490	917
ITT Corp.	799	995	769	1,163	870
Ford Motor Co.	752	509	791	754	769
Northrop Corp.	742	1,068	533	631	746
Bath Holding Corp.[c]	465	(d)	(d)	218	734
Allied Signal Inc.	1,043	943	711	906	725
Texas Instruments Inc.	1,435	1,109	1,232	946	704
FMC Corp.	863	744	862	796	634

Source: Department of Defense, "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards" (Annually).

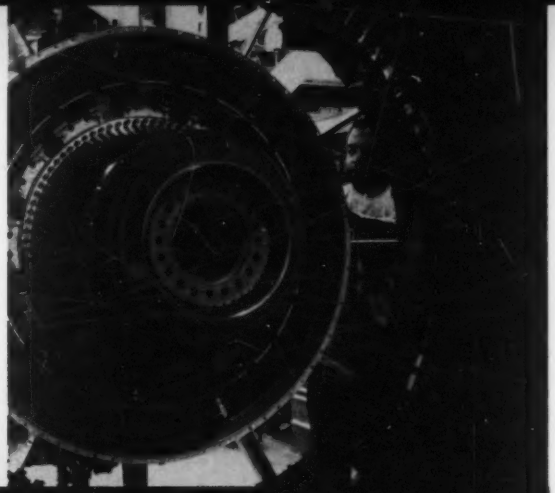
a Includes amounts previously reported for Hughes Aircraft Co.
b Includes amounts previously reported for Sperry and Burroughs Corporations.
c Includes amounts previously reported for Bath Iron Works Corporation.
d Not in top 100 companies for indicated year(s).

DEPARTMENT OF DEFENSE
PRIME CONTRACT AWARDS OVER $25,000
FOR SELECTED MAJOR MILITARY HARD GOODS

By Geographic Region
Fiscal Years 1988, 1989, and 1990

Program and Region	Millions of Dollars			Percent of Program Total		
	1988	1989	1990	1988	1989	1990
AIRCRAFT—TOTAL	$27,089	$27,565	$27,107	100.0%	100.0%	100.0%
New England	3,466	3,872	3,098	12.8	14.0	11.4
Middle Atlantic	3,211	2,738	3,226	11.9	9.9	11.9
East North Central	2,760	2,797	2,648	10.2	10.1	9.8
West North Central	4,307	5,082	5,227	15.9	18.4	19.3
South Atlantic	2,602	2,142	2,344	9.6	7.8	8.6
East South Central	342	222	324	1.3	0.8	1.2
West South Central	4,038	4,458	3,909	14.9	16.2	14.4
Mountain	881r	1,175	1,909	3.3	4.3	7.0
Pacific[a]	5,482	5,079	4,423	20.2	18.4	16.3
MISSILE & SPACE SYSTEMS—TOTAL	$21,450	$20,655r	$18,630	100.0%	100.0%	100.0%
New England	3,324	3,075	2,220	15.5	14.9	11.9
Middle Atlantic	1,354	1,263	1,252	6.3	6.1	6.7
East North Central	167	102	57	0.8	0.5	0.3
West North Central	1,108	1,034	521	5.2	5.0	2.8
South Atlantic	1,612	1,525	1,707	7.5	7.4	9.2
East South Central	828	921	658	3.9	4.5	3.5
West South Central	1,416	1,255	1,470	6.6	6.1	7.9
Mountain	3,420	3,584	3,429	15.9	17.4	18.6
Pacific[a]	8,219	7,896	7,285	38.3	38.2	39.1
ELECTRONICS & COMMUNICATIONS EQUIPMENT—TOTAL	$18,588	$19,369	$19,876	100.0%	100.0%	100.0%
New England	1,730	3,464	3,053	9.3	17.9	15.4
Middle Atlantic	3,429	3,222	3,270	18.4	16.6	16.5
East North Central	1,275	1,345	1,002	6.9	6.9	5.0
West North Central	1,030	938	901	5.5	4.8	4.5
South Atlantic	5,006	4,430	5,110	26.9	22.9	25.7
East South Central	124	94	221	0.7	0.5	1.1
West South Central	1,208	1,014	989	6.5	5.2	5.0
Mountain	1,038	900	866	5.6	4.6	4.4
Pacific[a]	3,747	3,962	4,464	20.2	20.5	22.5

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Includes Alaska and Hawaii.
r Revised.



91-92 Glossary

Aeronautics:
the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

AIA:
Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

Aerospace Industry:
the industry engaged in research, development and manufacture of aerospace systems, including manned and unmanned aircraft; missiles, space launch vehicles, and spacecraft; propulsion, guidance and control units for all of the foregoing; and a variety of airborne and ground based equipment essential to the test, operation, and maintenance of flight vehicles.

Aerospace Employment:
annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft and missile and space industries (SIC 372 and 376) plus estimated aerospace-related employment in the communications equipment (SIC 3662) and instruments (SIC 381 and 382) industries and in certain other industries (SIC 28, 35, 73, 89, etc.).

Aerospace Payroll:
estimated on the basis of average weekly earnings for a given calendar year for production workers plus an estimated annual salary for other employees.

Aerospace Sales:
the AIA estimate of aerospace industry sales, developed by summing DOD expenditures for aircraft, missiles, and space-related procurement and RDT&E; NASA expenditures for research and development, and space flight control and data communications; outlays for space activities by other U.S. Government departments and agencies; commercial sales of space-related products; net domestic and export sales of civil aircraft, engines, and parts; FMS and commercial exports of military aircraft, missiles, propulsion, and related parts; and sales of related products and services, including electronics, software, and ground support equipment, plus sales of non-aerospace products which are produced in aerospace-manufacturing establishments and which use technology, processes, and materials derived from the aerospace industry. See also *Related Products and Services*.

Air Carriers:
the commercial system of air transportation, consisting of domestic and international scheduled and charter service.

Aircraft:
all airborne vehicles supported either by buoyancy or by dynamic action.

Used in this volume in a restricted sense to mean an airplane—any winged aircraft, including helicopters but excluding gliders and guided missiles.

Aircraft Agreement (Agreement on Trade in Civil Aircraft):
negotiated in the Tokyo Round of the Multilateral Trade Negotiations, and implemented January 1, 1980, providing for elimination of tariff and non-tariff trade barriers in the civil aircraft sector.

Aircraft Industry:
the industry primarily engaged in the manufacture of aircraft, aircraft engines and parts, aircraft propellers and parts, and aircraft parts and auxiliary equipment. A sector of the *Aerospace Industry*.

Airframe:
the structural components of an airplane, such as fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as engines, accessories, electronics and other parts that may be replaced from time to time.

Airlines:
see *Air Carriers*.

Appropriation (Federal Budget):
an act of Congress authorizing an agency to incur obligations and make payments out of funds held by the Department of the Treasury.

Assets, Net:
the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

Astronautics:
the art and science of designing, building and operating manned or unmanned space objects.

Average Weekly Hours:
average hours for which pay was received; different from standard or scheduled hours.

Avionics:
Communications, navigation, flight controls, and displays.

Backlog:
the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

Budget Authority:
authority provided by the Congress; mainly in the form of *Appropriations*, which allows Federal agencies to incur obligations to spend or lend money.

Bureau of the Census:
an agency of the Department of Commerce.

Bureau of Economic Analysis (BEA):
an agency of the Department of Commerce.

Bureau of Labor Statistics (BLS):
an agency of the Department of Labor.

Constant Dollars:
see *Deflator*.

Deflator:
index used to convert a price level to one comparable with the price level at a different time, offsetting the effect of inflation. The base period, which equals 100, is usually specified as either a given fiscal or calendar year. *Constant Dollars* are calculated by dividing current ('then-year') dollars by appropriate price deflator, and multiplying by 100.

Depreciation:
the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

Development:
the process or activity of working out a basic design, idea or piece of equipment. See also *R&D*.

DOD:
Department of Defense.

DOE:
Department of Energy.

DOT:
Department of Transportation.

Durable Goods Industry:
comprised of major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered nondurable goods manufacturing industry groups.

Earnings:
the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

Average Hourly Earnings: on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid for an incentive plan.

Average Weekly Earnings: derived by multiplying average weekly hours by hourly earnings.

ERDA:
Energy, Research and Development Administration. ERDA was formed in 1974 to bring together activities previously scattered among several agencies. The major elements covered were nuclear energy, fossil energy, solar and geothermal energy, conservation through increased efficiency and environmental controls. Most of these functions were assumed by the Department of Energy as of October 1, 1977.

Establishment:
the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

Evaluation (Department of Defense):
determination of technical suitability of material, equipment or a system; see *RDT&E*.

Expenditures (Federal Budget):
see *Outlays*.

Exports:
domestic merchandise including commodities which are grown, produced, or manufactured in the United States, and commodities of foreign origin which have been changed in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States, and which are traded or sold to other nations.

Export-Import Bank of the United States (Eximbank):
created in 1934, and established as an independent U.S. Government Agency in 1945, Eximbank is designed ". . . to aid in financing and to facilitate exports . . ." Eximbank receives no appropriations from the U.S. Congress. It is directed by statute to (1) offer financing that is competitive with that offered exporters of other countries by their official export credit institutions, (2) determine that the transactions supported provide for a reasonable assurance of repayment, (3) supplement, but not compete with private sources of export financing, and (4) take into account the effect of its activities on small business, the domestic economy, and U.S. employment.

FAA:
Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

Facility:
a physical plant or installation including real property, building, structures, improvements and plant equipment.

Fiscal Year (Federal Budget):
until June 30, 1976, year beginning July 1 and ending June 30, and designated by the year in which it ends. Beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end. A three month *Transition Quarter* from July 1 through September 30, 1976, belongs to neither fiscal year.

Flyaway Value:
includes the cost of the airframe, engines, electronics, communications, armament and other installed equipment.

Foreign Military Sales (FMS):
export sales to foreign governments arranged through the Department of Defense, whereby DOD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

FY:
see *Fiscal Year.*

General Agreement on Tariffs and Trade (GATT):
a multilateral treaty, subscribed to by 98 governments which together account for more than four-fifths of world trade; its aim is to liberalize world trade; the only multilateral instrument that lays down agreed rules for international trade.

General Aviation:
all civil flying except that of air carriers.

GNP (Gross National Product):
the market value of the total output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods. It includes the purchase of goods and services by consumers and government, gross private domestic investment and net exports.

Helicopter:
a rotary-wing aircraft which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a *V/STOL.*

Heliport:
an area, either at ground level or elevated on a structure, that is used for the landing and take-off of *helicopters* and includes some or all of the various facilities useful to helicopter operations such as helicopter parking, hangar, waiting room, fueling and maintenance equipment.

Helistop:
a minimum facility *heliport*, either at ground level or elevated on a structure for the landing and takeoff of *helicopters* but without such auxiliary facilities as waiting room, hangar parking, etc.

ICBM:
Intercontinental Ballistic Missile, with a range of more than 5,000 miles.

Imports:
classified as "general imports" or "imports for consumption." This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials, and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

Income:
Net Operating Income:
total net sales (see *Sales*) less total operating costs.
Net Income (Before Income Taxes):
Net Operating Income plus or minus *"Other Income and Expenses."*
Other Income and Expenses:
includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.
Net Income (After Income Taxes):
Net Income (Before Taxes) less federal income taxes.

Lump-Sum Wage Payment:
a one time payment given in lieu of general wage increases and/or cost of living adjustments in labor settlements.

Manufacturing Industries:
those *establishments* engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials-handling

equipment; also establishments engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

Merchandise Trade Balance:
the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when *exports* exceed *imports*—a trade surplus—and "unfavorable" when *imports* exceed *exports*—a trade deficit.

Missile:
sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, *i.e.*, a weapon which has an integral system of guidance, as opposed to the unguided rocket.

Multilateral Trade Negotiations (MTN):
a forum within the *GATT* in which countries negotiate to overcome their trade problems. In September 1986, in Punta del Este, Uraguay, over 100 nations launched a new round of multilateral trade negotiations, called the "Uraguay Round." The purpose of the "Uraguay Round" is to strengthen the *GATT* and expand its disciplines to new areas such as services, agriculture and trade-related intellectual property rights.

NASA:
National Aeronautics and Space Administration.

NATO:
North Atlantic Treaty Organization.

New Obligational Authority (Federal Budget):
see *Budget Authority*.

Non-Aerospace Products and Services:
products and services other than aircraft, missiles, space vehicles, and related propulsion and parts, produced or performed by establishments whose principal business is the development and/or manufacture of aerospace products.

OASD:
Office of the Assistant Secretary of Defense.

Obligations (Federal Budget):
commitments made by Federal agencies to pay out money for products, services or other purposes—as distinct from the actual payments. Obligations incurred may not be larger than *budget authority*.

Orders, Net New:
the sales value of new orders (supported by legal documents) minus cancellations during the period.

Other Aerospace Products and Services:
all conversions, modifications, site activation, and other aerospace products (including drones) and services, plus research and development under contract, defined as basic and applied research in the sciences and in engineering, and design and development of prototype products and processes.

Other Customers:
All customers other than the U.S. Government to include but not limited to: air carriers, private citizens and corporations, state, local, and foreign governments.

Outlays:
checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

Overtime Hours:
that portion of the gross average weekly hours which was in excess of regular hours and for which premium payments were made.

Passenger-Mile:
one passenger moved one mile.

Payroll, All Manufacturing:
includes the gross earning paid in the calendar year to all employees on the payroll of operating manufacturing *establishments*. Includes all forms of compensation paid directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions,

withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other non-payroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

Procurement:
the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

Production Workers:
includes working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use and record keeping and services closely associated with the above production operations.

R&D:
Research and Development.

Research: systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either *basic* or *applied* according to the objectives of the sponsoring agency.

Basic Research: with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Applied Research: with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Development: the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods including design and development of prototype and processes.

Independent Research and Development (IR&D): a term devised by the Department of Defense and used by Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

Industrial Research and Development: research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

RDT&E (Department of Defense):
Research, Development, Test and Evaluation.

Related Products and Services:
sales of electronics, software, and ground equipment in support of aerospace products, plus sales by aerospace manufacturing establishments of systems and equipment which are generally derived from the industry's aerospace technological expertise in design, materials, and processes, but which are intended for applications other than flight.

Research:
see *R&D*.

Rotorcraft:
an aircraft which in all its usual flight attitudes is supported in the air wholly or in part by a rotor or rotors, *i.e.*, airfoils rotating or revolving about an axis (see *Helicopter*).

Sales:
net of returns, allowances, and discounts, the dollar value of shipments, including dealer's commission, if any, which have passed through the sales account.

Satellite:
a body that revolves around a larger body, such as the moon revolving around the earth, or a man-made object revolving about any body such as the sun, earth, or moon.

SIC (Standard Industrial Classification):
a system developed by the U.S. Government to define the industrial composition of the economy, facilitating

comparability of statistics. See *Aerospace Industry* for explanation of SIC codes applicable to the aerospace industry.

Space Vehicle:
an artificial body operating in outer space (beyond the earth's atmosphere).

Stockholder's Equity:
assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures.) For details, see "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations," compiled by the Bureau of the Census.

STOL:
short take-off and landing aircraft.

Test (Department of Defense):
an experiment designed to assess progress in attainment or accomplishment of development objectives (see *RDT&E*).

Thrust:
the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

Ton-Mile:
one ton moved one mile.

Total Obligational Authority:
the sum of *budget authority* granted or requested from the Congress in a given year, plus unused *budget authority* from prior years.

Trade Balance:
see *Merchandise Trade Balance*.

Transition Quarter (Tr. Qtr.):
the three-month interval from July 1, 1976 to September 30, 1976. See *Fiscal Year*.

Turbine, Turbo:
a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turboprop" or "turbojet."

U.K.:
United Kingdom.

U.S.:
United States of America.

USA:
United States Army, an agency of the U.S. Department of Defense.

USAF:
United States Air Force, an agency of the U.S. Department of Defense.

USN:
United States Navy, an agency of the U.S. Department of Defense.

USSR:
Union of Soviet Socialist Republics.

Utility Aircraft:
an aircraft designed for general purpose flying.

V/STOL:
vertical short take-off and/or landing aircraft.

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Allied-Signal Aerospace Company
Aluminum Company of America
American Pacific Corporation
Argo-Tech Corporation
BASF Structural Materials, Inc.
Bechtel National, Inc.
Best Foam Fabricators, Inc.
B.H. Aircraft Company, Inc.
The Boeing Company
Chrysler Technologies Corporation
Coltec Industries Inc.
  Chandler Evans
  Menasco Aerosystems
Dowty Aerospace Los Angeles
E-Systems, Inc.
The Fairchild Corporation
FMC Corporation
GEC-Marconi Electronic Systems Corporation
General Dynamics Corporation
General Electric Company
General Motors Corporation
  General Motors Hughes Electronics
    Delco, Electronics
    Hughes Aircraft Company
  Allison Gas Turbine Division
The BFGoodrich Company
  Aircraft Wheels and Brakes
  Engine and Fuel Systems
  Instruments and Avionics
  Maintenance Repair and Overhaul
  Specialty Products
Grumman Corporation
Gulfstream Aerospace Corporation
Harris Corporation
Heath Tecna Aerospace Company
HEICO Corporation
Hercules Incorporated
Hexcel Corporation
Honeywell Inc.
IBM Corporation
  Federal Sector Division
ITT Defense, Inc.
Kaman Aerospace Corporation
Lockheed Corporation
Lord Corporation
The LTV Corporation
Lucas Aerospace Inc.
Martin Marietta Corporation
McDonnell Douglas Corporation
Northrop Corporation
Ontaric Corporation
Parker Hannifin Corporation
Precision Castparts Corporation
Raytheon Company
Rockwell International Corporation
Rohr Industries, Inc.
Smiths Industries Aerospace & Defense Systems, Inc.
Sundstrand Corporation
Teledyne, Inc.
  Teledyne Brown Engineering
  Teledyne Controls
Texas Instruments Incorporated
  Defense Systems & Electronics Group
Textron Inc.
Thiokol Corporation
TRW Inc.
United Technologies Corporation
  Aerospace/Defense:
    Pratt & Whitney
    Sikorsky
    Hamilton Standard
    Norden
Westinghouse Electric Corporation
  Electronic Systems Group
Williams International

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